ADT-HC8200

Flame / Plasma Cutting Machine CNC System

User's Manual

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Basic Manual Info

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Precautions

※ Transportation and storage

- ☞ The packaging boxes shouldn't be stacked more than six layers
- ☞ Do not climb onto, stand on or put heavy objects on the packaging box
- ☞ Do not drag or convey the product with a cable connected to the product
- ☞ Do not impact or scratch the panel and display
- ☞ Keep the packaging box away from moisture, insulation and rain

※ Unpacking and checking

- ☞ Unpack and check whether the product is the one you ordered
- ☞ Check whether the product is damaged during transporting
- ☞ Check whether the parts are complete and intact according to the packing list
- ☞ If the model doesn't match, any accessories are missing or damaged, please contact us immediately

※ Wire connection

- ☞ The personnel for wire connection and checking should be qualified
- ☞ The product must be grounded reliably (resistance < 4Ω) and do not use neutral wire to replace the earth wire
- ☞ The wires must be connected properly and firmly to avoid failures and accidents
- ☞ The surge absorption diode must be connected to the product properly, or else it will damage the product
- ☞ Please cut off the power supply before inserting/removing the plug or opening the enclosure

※ Checking and repairing

- ☞ Please cut off the power supply before repairing or replacing the components
- ☞ Check the failure if short circuit or overload occurs, and restart after eliminating all failures
- ☞ Do not connect/cut off the power supply frequently; wait for at least one minute before restarting

※ Others

- ☞ Do not open the enclosure without permission
- ☞ Please cut off the power supply if it won't be used for a long time
- ☞ Prevent dust and iron powder from entering the controller
- ☞ If non-solid state relay is used for output, please connect freewheeling diode to relay coil in parallel. Check whether the connected power supply is qualified to avoid burning out the controller
- ☞ The lifetime of the controller depends on the environment temperature. If the temperature of processing field is too high, please install cooling fan. The allowable temperature range of the controller is 0℃-60℃
- ☞ Avoid using in the environment with high temperature, moisture, dust or corrosive gas
- ☞ Install rubber cushion if the vibration is severe

※ Maintenance

Under normal condition (environment: daily average 30℃, load rate 80%, running rate 12 hours every day), please perform daily and periodic checking according to the items below.

Daily checking	Daily	● Confirm environment temperature, humidity and dust ● Whether there is abnormal vibration or sound ● Whether the vent hole is blocked by yarn
Periodic checking	1 year	● Whether the fixed parts are loose ● Whether the terminal block is damaged

Contentes

1 Chapter I Product Overview

1.1 System interface

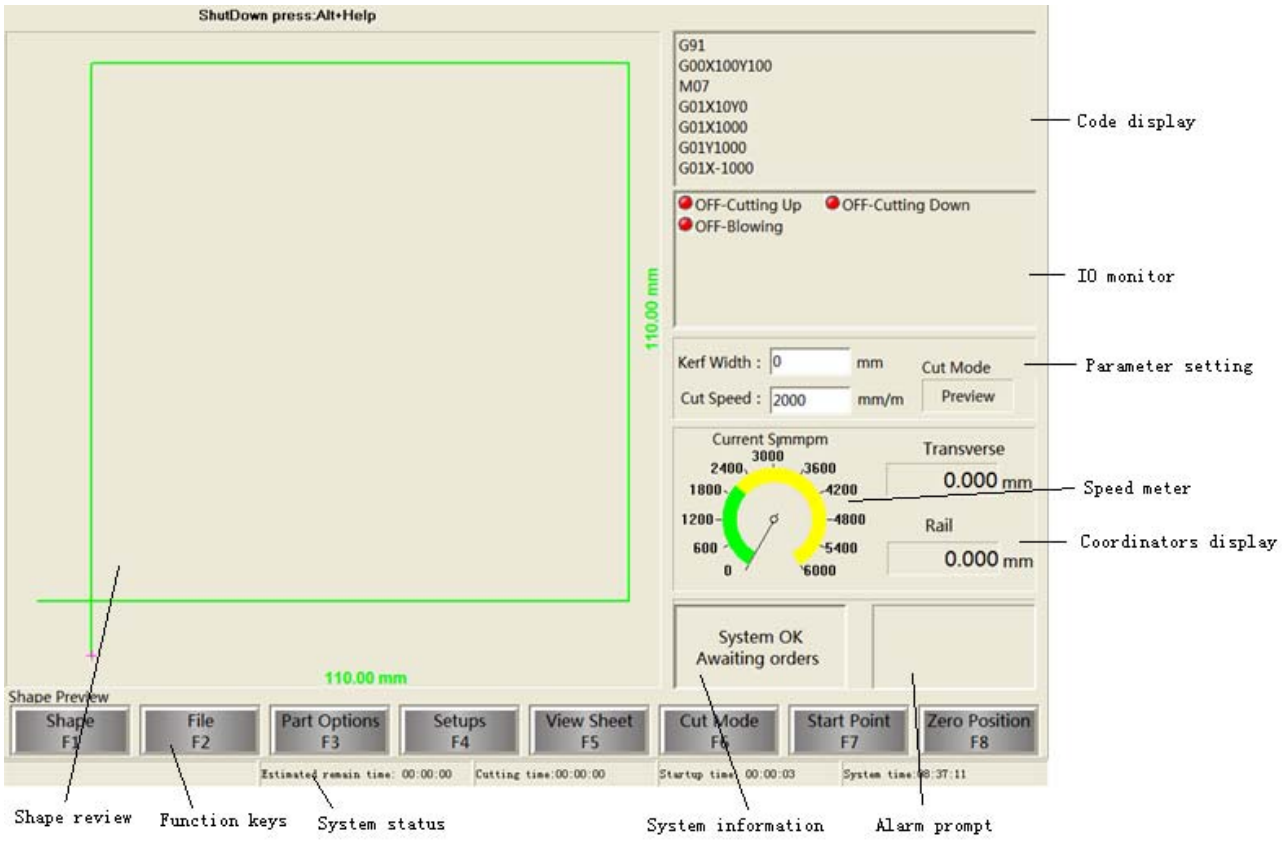


Figure 1.1.1 Main interface

The main interface includes the following sectors:

Shape review-: preview the image to be cut.

Function keys: functions keys from F1 to F8

Code display: display G code of the image to be cut.

IO Monitor: display output statues under current cutting mode.

Speed meter：display current cutting speed.

Parameter setting: currently set seam value, cutting speed, etc.

System information: display important information in the process of cutting.

Alarm information: display limit and alarm information.

System status: display system startup time, processing time, etc.

Coordinate display: display coordinates of torch.

1.2 Function

The system adopts Intel Atom low power consumption CPU and WINDOWS operation system, which provides multi-function, multi-window and multi-threading technology, allowing fast processing speed and convenient and visible operation. The 15 Inch industrial grade LCD can display rich information. With the high stable hardware and high performance software, this controller is a cutting digital control system with high cost performance that you can always trust.

HC8200 adopts 4-axis (Y1 and Y2 are synchronizing axis) signal output. It provides true/false bilateral drive interface, external keyboard interface, USB (primary and secondary) interface, RS232 communication interface and two Ethernet interfaces.

The main function includes:

1) WINDOWS XP operation system, multi-language human-computer interface.
2) Slotting/Kerf compensation.
3) Rotating and mirroring functions of part processing surface
4) Compatible with ISO － G code and ESSI code.
5) Customized steel plate area.
6) Switchable among five cutting types including preview, flame, plasma, powder -spraying laying out and plasma marking.
7) Manually or automatically compatible with the functions including ignition, air flaming, oxygen cutting, Torch height adjustment, oxygen preheating and arc striking.
8) Part cutting calibration
9) Auto returning to absolute point.
10) Relative zero setting.
11) Support manual inching and self-locking.
12) Shape display zooming in/out and translation.
13) Auto defining cutting order while nesting.
14) Auto process saving.
15) Synchronous process tracking and display.
16) Real time display of control status.
17) Come back/go forward.

18) Pause/resume
19) Support breakpoint memory, including emergency stop memory, alarm memory, power failure memory (UPS required).
20) Real time displays of current coordinates and speed of machine tool.
21) Intelligent inflexion speed ACC/DCC.
22) Speed ACC/DCC control in cutting process.
23) Increase/decrease preheating time in preheating and perforating processes.
24) Auto ignition control, stalling control, high pressure oxygen control and discharging control.
25) Support inspection, replacement, service time memory and alarm of wearing parts.
26) Support transformation between CAD and DXF files.
27) Support Shapes library.
28) Support touch screen and standard PS/2 and USB keyboard.
29) Support USB removable storage devices.
30) Built-in diagnosis function helps for troubleshooting.

1.3 Product configuration

1) CPU: Intel(R) Atom(TM) CPU N270 @ 1.60GHz
2) Monitor (AIO): 15” industrial color LCD
3) RAM and HDD: 1GB; 16G high stable CF card.
4) USB: USB2.0.
5) Keyboard: filmed industrial keyboard.
6) Case: all steel structure.
7) Power supply: PS/2 ATX power supply, 300W, AC 220 input

1.4 Basic specifications

Weather condition		
Temperature	Working	-5℃ to 50℃
	Storage and transportation	-30℃ to 70℃
Relative humidity	Working	20％ to 90％ (℃)
	Storage and transportation	10％ to 95％ (℃)
Atmosphere pressure		86Kpa to 106Kpa
Power supply		AC 220V
Power		300W
Power consumption		300W

2 Chapter II Electrical Wiring

2.1 External interfaces

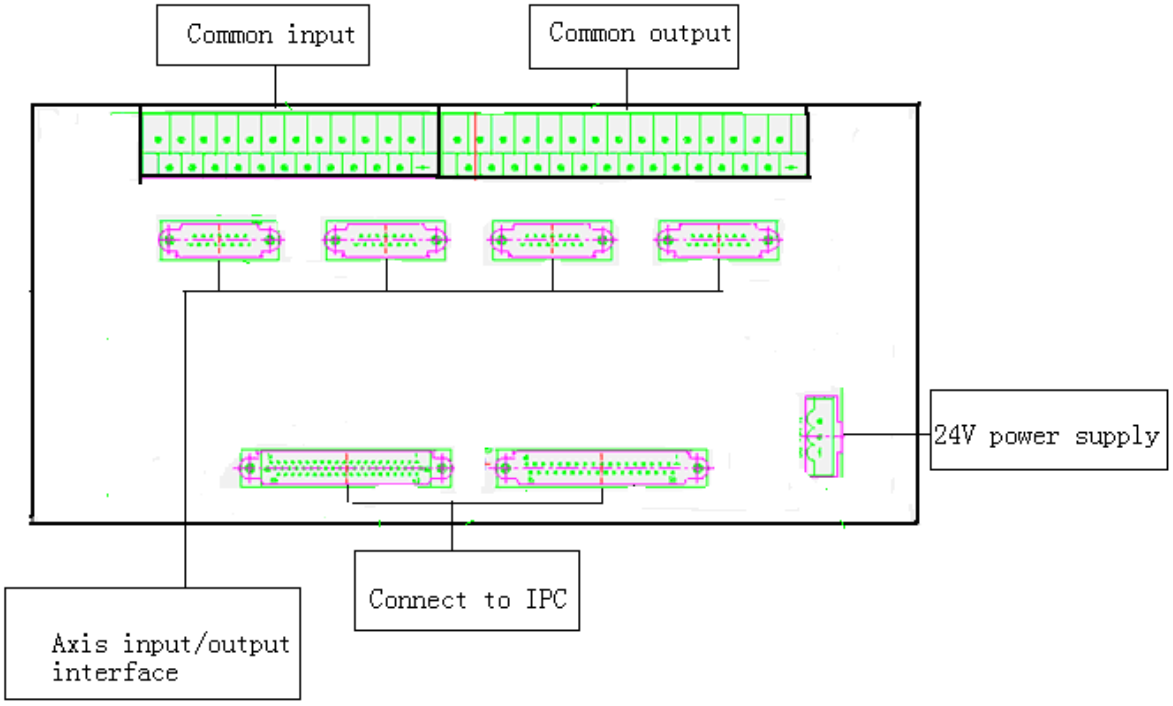


Figure 2.1.1 External interfaces

Connect to PC: interface between interface board and PC communication. The two interfaces are 37 pins and 64 pins respectively.

Input power supply: power supply interface for interface board; the power input is 24V.

Axis input/output interface: interface for pulse output, direction output and servo enabling output of the axis.

Input interface: general IO input interface.

Output interface: general IO output interface.

2.2 Overall connection

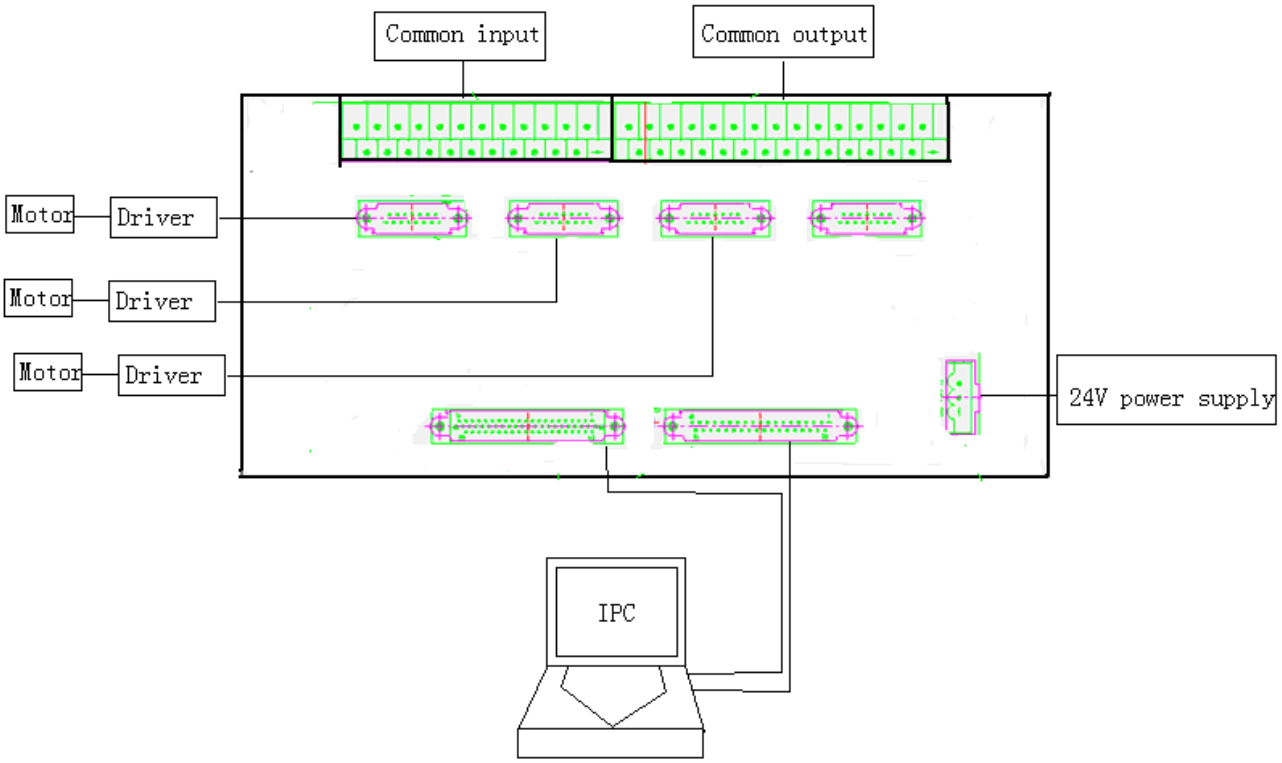


Figure 2.2.1 Overall connection

2.3 Interface definition and wiring

2.3.1 Axis input/output interface

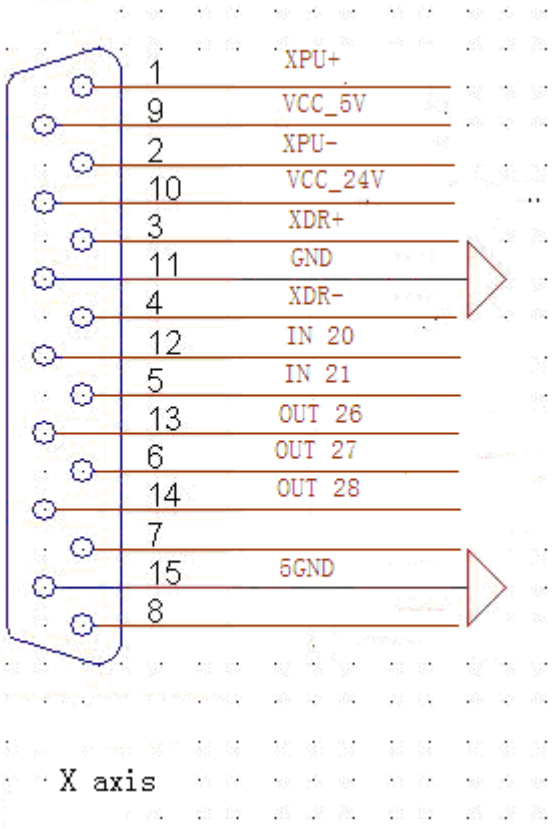


Figure: 2.3.1.1 X-axis interface

Line No.	Name	Function
1	XPU+	Positive pulse signal of X axis
2	XPU-	Negative pulse signal of X axis
3	XDR+	Positive direction signal of X axis
4	XDR-	Negative direction signal of X axis
5	INT21	Location arriving signal of X axis
6	OUT27	X servo alarm clear
7	XECZ+	
8	XECZ-	
9	VCC5V	5V power output
10	VCC_24V	24V power output
11	OGND-	24V power output grounding
12	IN20	X servo alarm input (valid at low level)
13	OUT26	X servo enabling
14	OUT28	X servo counter zeroing
15	5GND	5V power output grounding

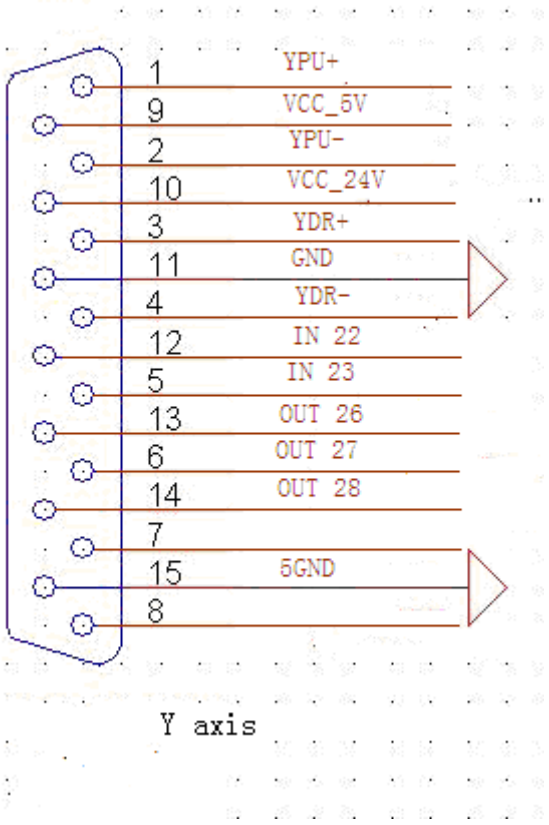


Figure 2.3.1.2 Y1-axis interface

Line No.	Name	Function
1	XPU+	Positive pulse signal of Y1-axis
2	XPU-	Negative pulse signal of Y1-axis
3	XDR+	Positive direction signal of Y1-axis
4	XDR-	Negative direction signal of Y1-axis
5	INT23	Position arriving signal of Y1-axis
6	OUT27	Y1 servo alarm clear
7	XECZ+	
8	XECZ-	
9	VCC5V	5V power output
10	VCC_24V	24V power output
11	OGND-	24V power output grounding
12	IN22	Y1 servo alarm input (valid at low level)
13	OUT26	Y1 servo enable
14	OUT28	Y1 servo counter zeroing
15	5GND	5V power output grounding

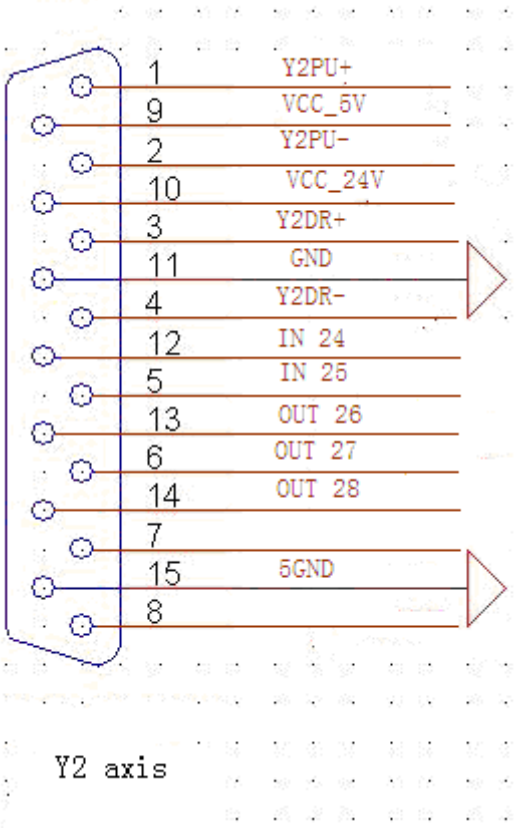
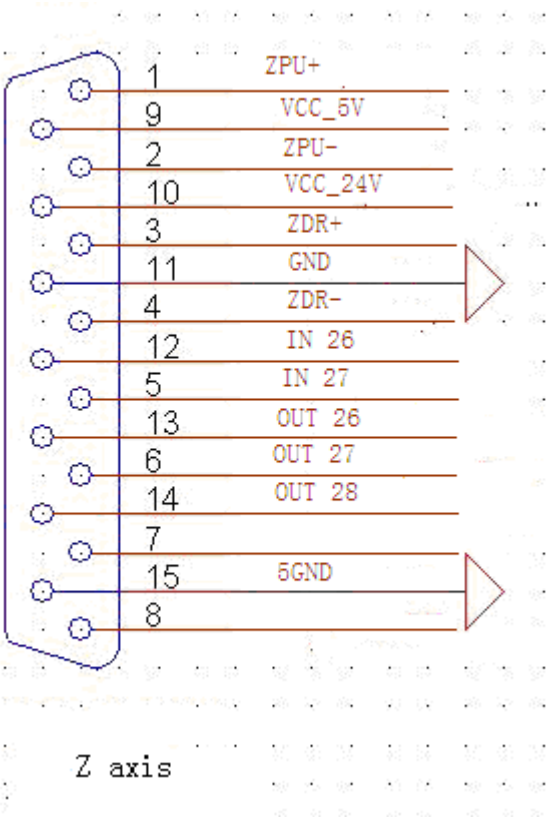


Figure 2.3.1.3 Y2-axis interface

Line No.	Name	Function
1	XPU+	Positive pulse signal of Y2-axis
2	XPU-	Negative pulse signal of Y2-axis
3	XDR+	Positive direction signal of Y2-axis
4	XDR-	Negative direction signal of Y2-axis
5	INT25	Position arriving signal of Y2-axis
6	OUT27	Y2 servo alarm clear
7	XECZ+	
8	XECZ-	
9	VCC5V	5V power output
10	VCC_24V	24V power output
11	OGND-	24V power output grounding
12	IN24	Y2 servo alarm input (valid at low level)
13	OUT26	Y2 servo enabling
14	OUT28	Y2 servo counter zeroing
15	5GND	5V power output grounding



Z axis

Figure 2.3.1.4 Z-axis interface

Line No.	Name	Function
1	XPU+	Positive pulse signal of Z-axis
2	XPU-	Negative pulse signal of Z-axis
3	XDR+	Positive direction signal of Z-axis
4	XDR-	Negative direction signal of Z-axis
5	INT27	Position arriving signal of Z-axis
6	OUT27	Z servo alarm clear
7	XECZ+	
8	XECZ-	
9	VCC5V	5V power output
10	VCC_24V	24V power output
11	OGND-	24V power output grounding
12	IN26	Z servo alarm input (valid at low level)
13	OUT26	Z servo enabling
14	OUT28	Z servo counter zeroing
15	5GND	5V power output grounding

2.3.2 General input interface

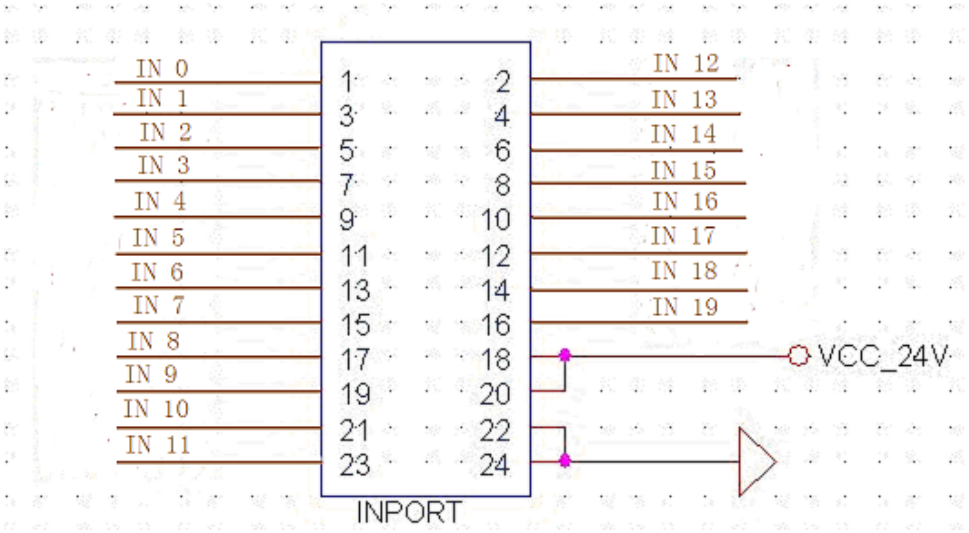


Figure 2.3.2.1 General input interface

Line No.	Name	Function
1	IN0	Positive limit of X-axis
2	IN12	Power supply alarm
3	IN1	Negative limit of X-axis
4	IN13	Plasma arc striking succeeded
5	IN2	Positive limit of Y-axis
6	IN14	Plasma anti-collision
7	IN3	Negative limit of Y-axis
8	IN15	Initial orientation of plasma height adju sting
9	IN4	Move up
10	IN16	Start
11	IN5	Move down
12	IN17	Emergency stop
13	IN6	Positive limit of Z-axis
14	IN18	Move left

15	IN7	Negative limit of Z-axis
16	IN19	Move right
17	IN8	X-axis zero point
18	VCC_24V	24V power output
19	IN9	Y-axis zero point
20	VCC_24V	24V power output
21	IN10	Standby 0
22	OGND	24V power output grounding
23	IN11	Z-axis zero point
24	OGND	24V power output grounding

2.3.3 General output interface

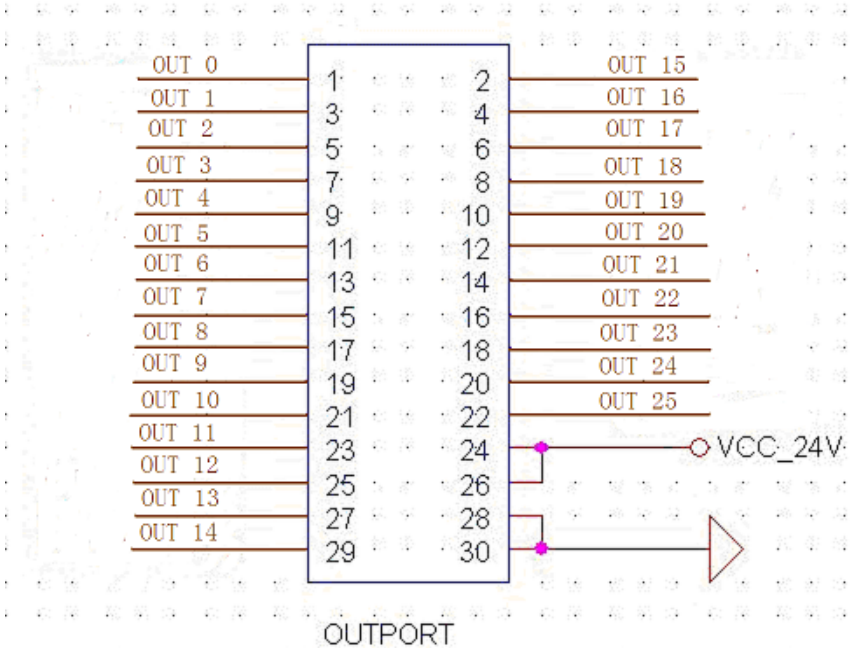


Figure 2.3.1 General output interface

Line No.	Name	Function
1	OUT0	Ignition
2	OUT15	Cutting torch 3 selection
3	OUT1	Fuel gas
4	OUT16	Cutting torch 4 selection
5	OUT2	Low preheating
6	OUT17	Flame selection
7	OUT3	High preheating
8	OUT18	Plasma selection
9	OUT4	High pressure oxygen (general valve)
10	OUT19	Powder spray marking selection
11	OUT5	Plasma arc striking
12	OUT20	Current adjusting/wireless perforating 1
13	OUT6	Auto height adjusting
14	OUT21	Current adjusting/wireless perforating 2

15	OUT7	Cutting torch up
16	OUT22	Current adjusting/wireless perforating 3
17	OUT8	Cutting torch down
18	OUT23	Standby 0
19	OUT9	Plasma local rise
20	OUT24	Discharging/blowing
21	OUT10	Plasma local drop
22	OUT25	Standby 1
23	OUT11	Plasma all rise
24	VCC_24V	24V power output
25	OUT12	Plasma all drop
26	VCC_24V	24V power output
27	OUT13	Cutting torch 1 selection
28	OGND	24V power output grounding
29	OUT14	Cutting torch 2 selection
30	OGND	24V power output grounding

2.3.4 Power supply interface

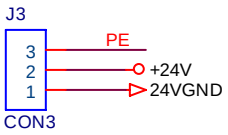


Figure 2.3.4.1 Power supply interface

2.4 Installation dimension charts

2.4.1 Controller dimensions

2.4.1.1 AIO

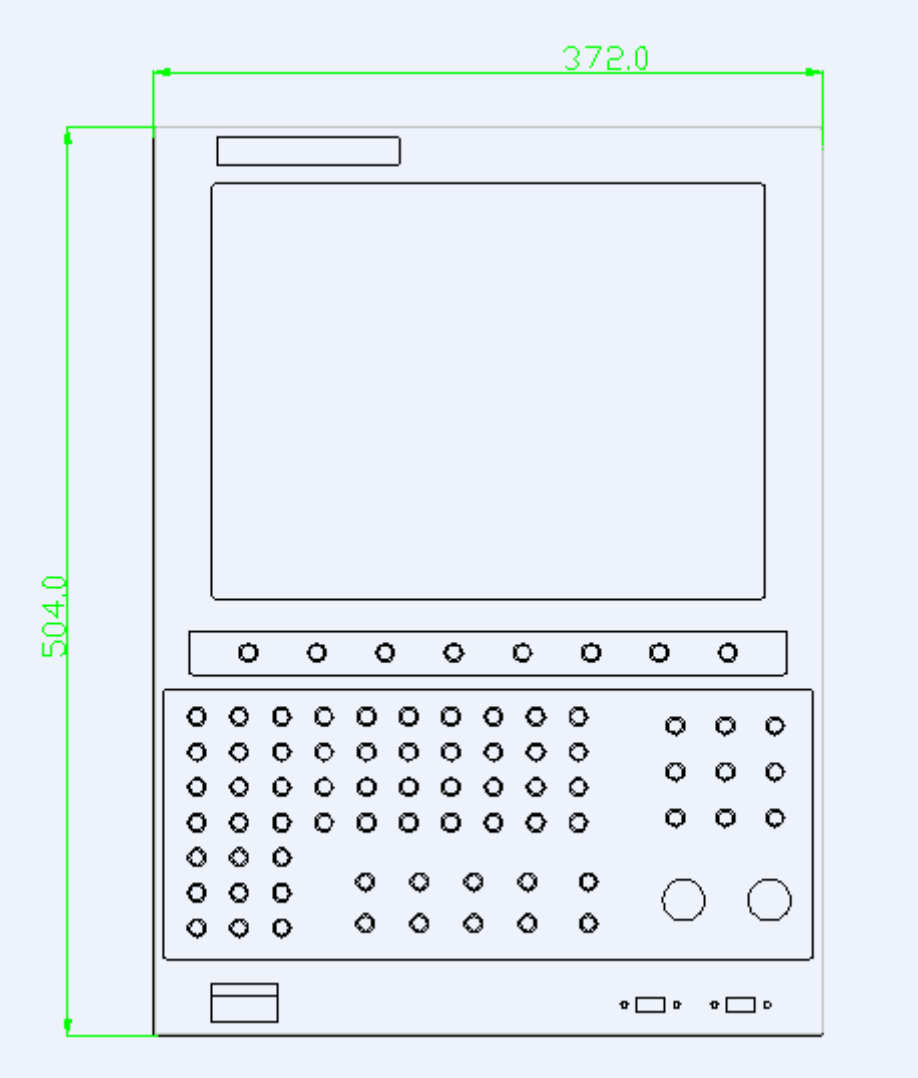


Figure 2.4.1.1.1 Front view of AIO controller

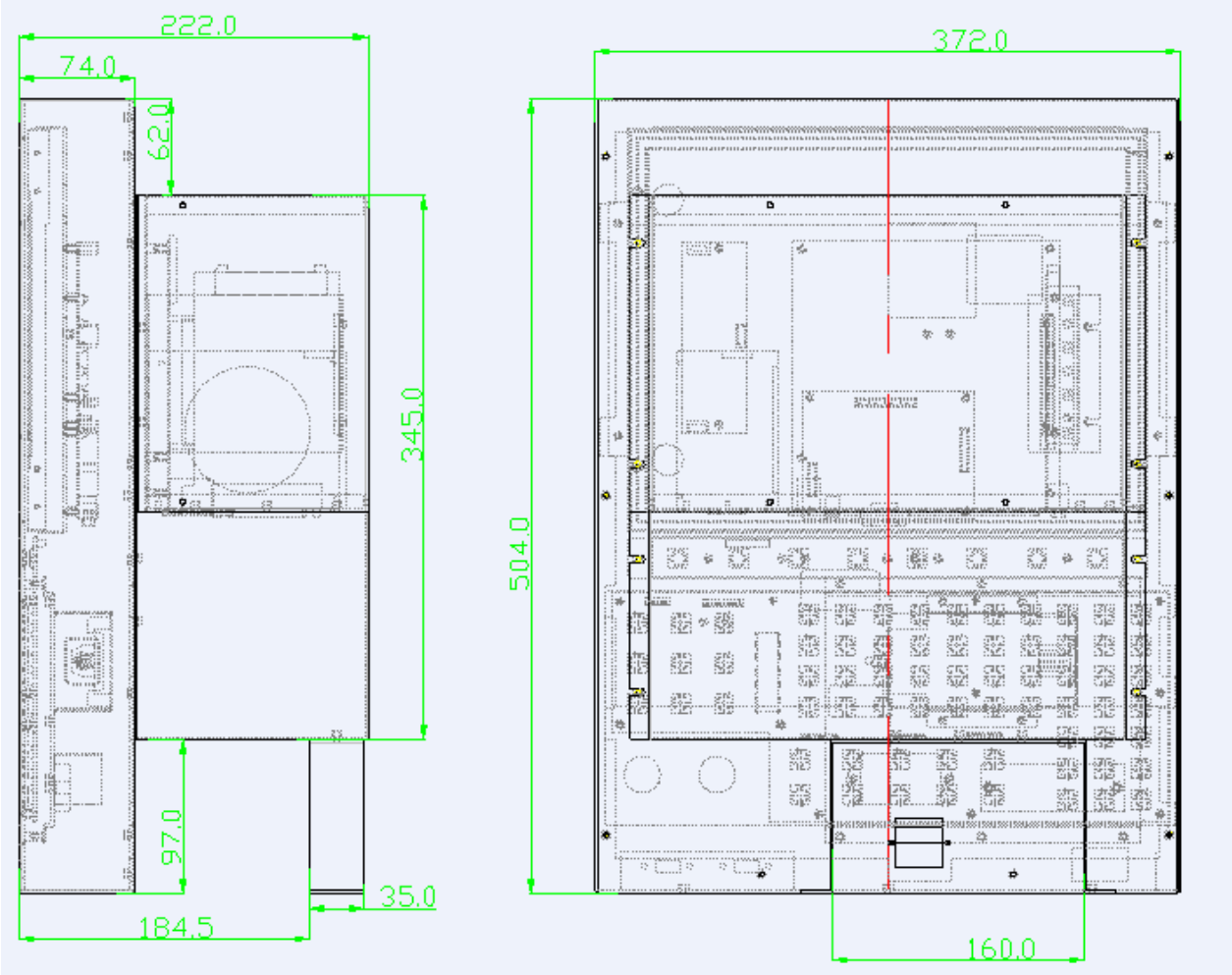


Figure 2.4.1.1.2 Side view of AIO controller

2.4.1.2 **Non-AIO**

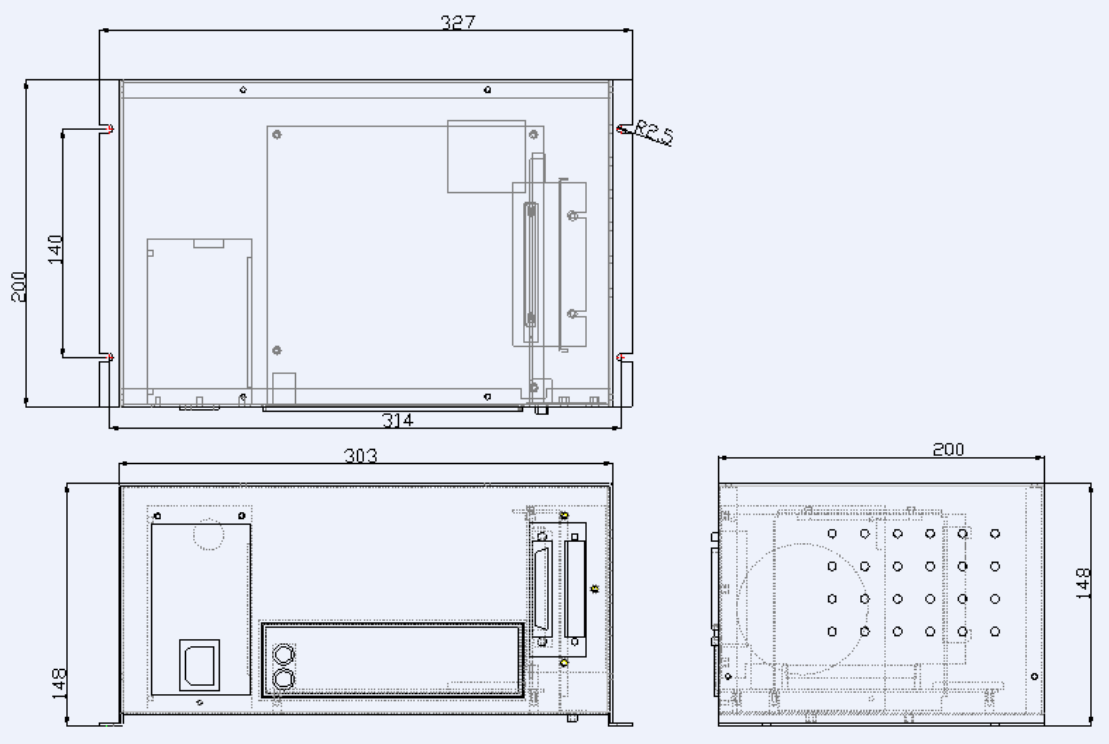


Figure 2.4.1.2.1 Host dimension chart of non-AIO

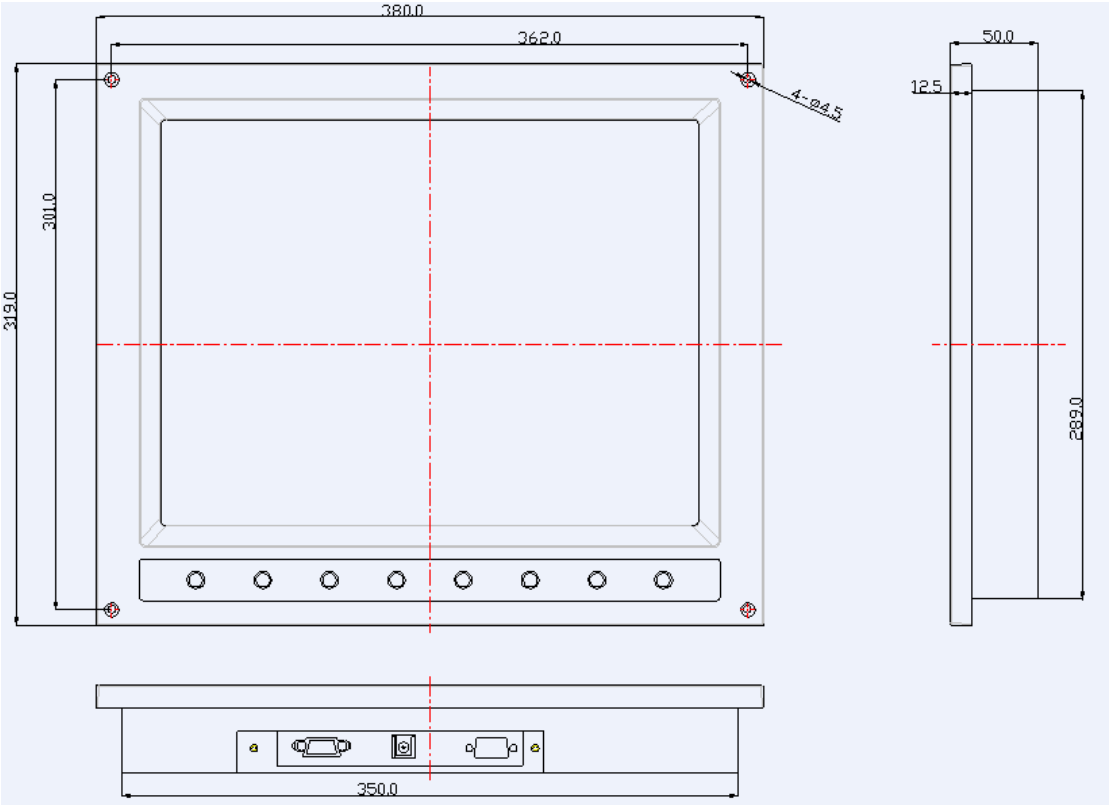


Figure 2.4.1.2.2 Monitor dimension chart of non-AIO

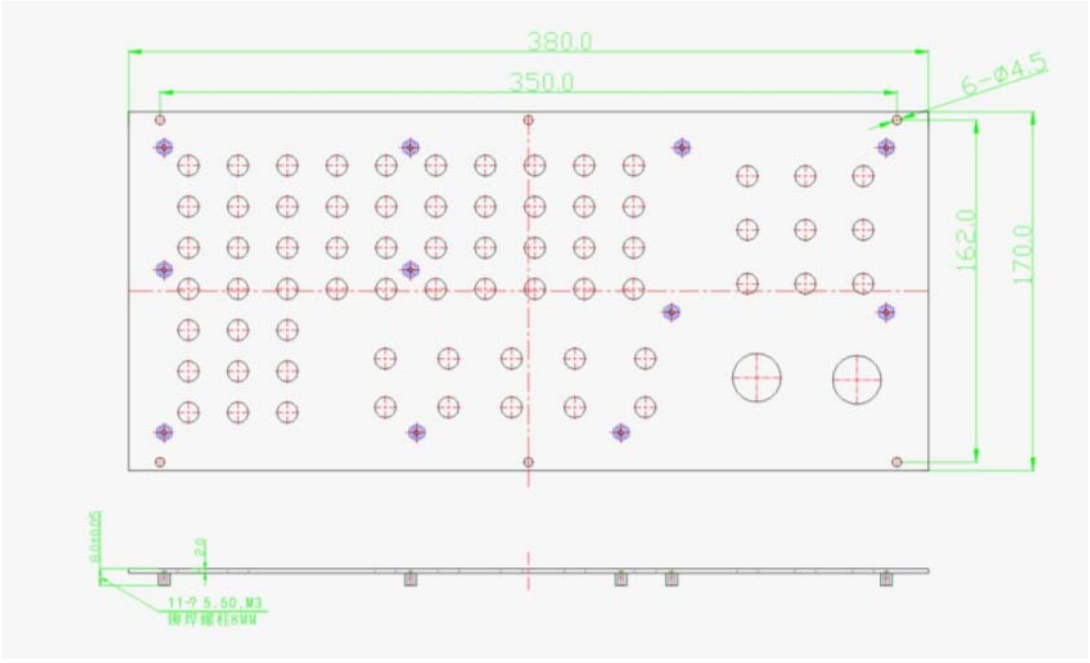


Figure 2.4.1.2.3 Monitor dimension chart of Keyboard

2.4.2 Interface board dimensions

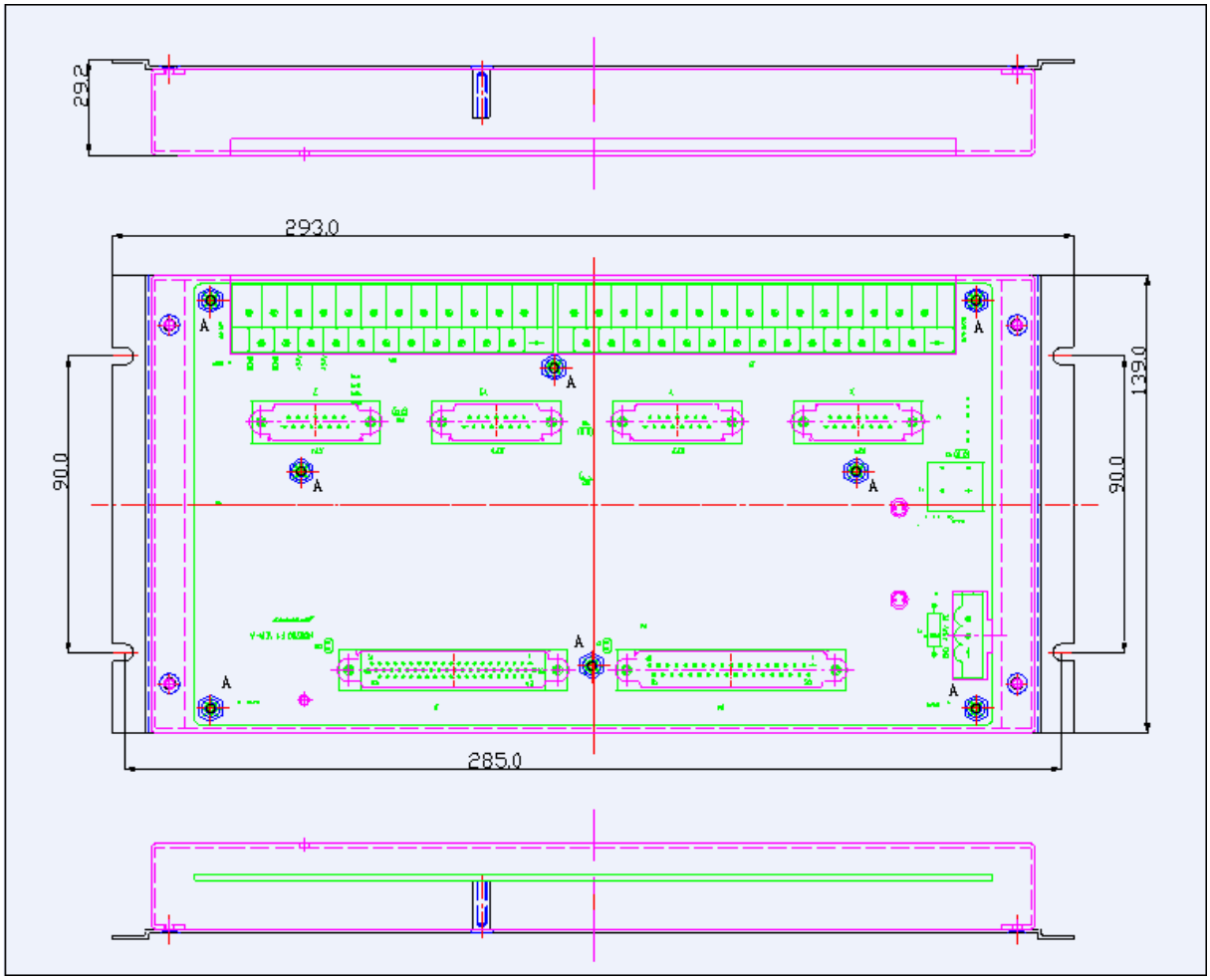


Figure 2.4.2.1 Interface board dimension chart

3 Chapter III Functions and Operations

3.1 Introduction

This two-axis controller system can be used to cut an objective according to the Shapes stored in the Shape library. It is mainly applied in cutting industry. The system enables a convenient operation with many built-in frequently used Shape.

The system requires a Dongle to run, so make sure the Dongle works well before powering on. In addition, when using the system, it is required to connect to an IO interface board, so check whether the IO interface board is properly connected before use. The system has only some Demo functions if no interface board is connected.

The system enters the welcome screen once it is started, as shown in Figure 3.1.1:

Figure 3.1.1 Welcome screen

Press any key under Welcome screen or wait for 5 seconds to enter main interface of the system：

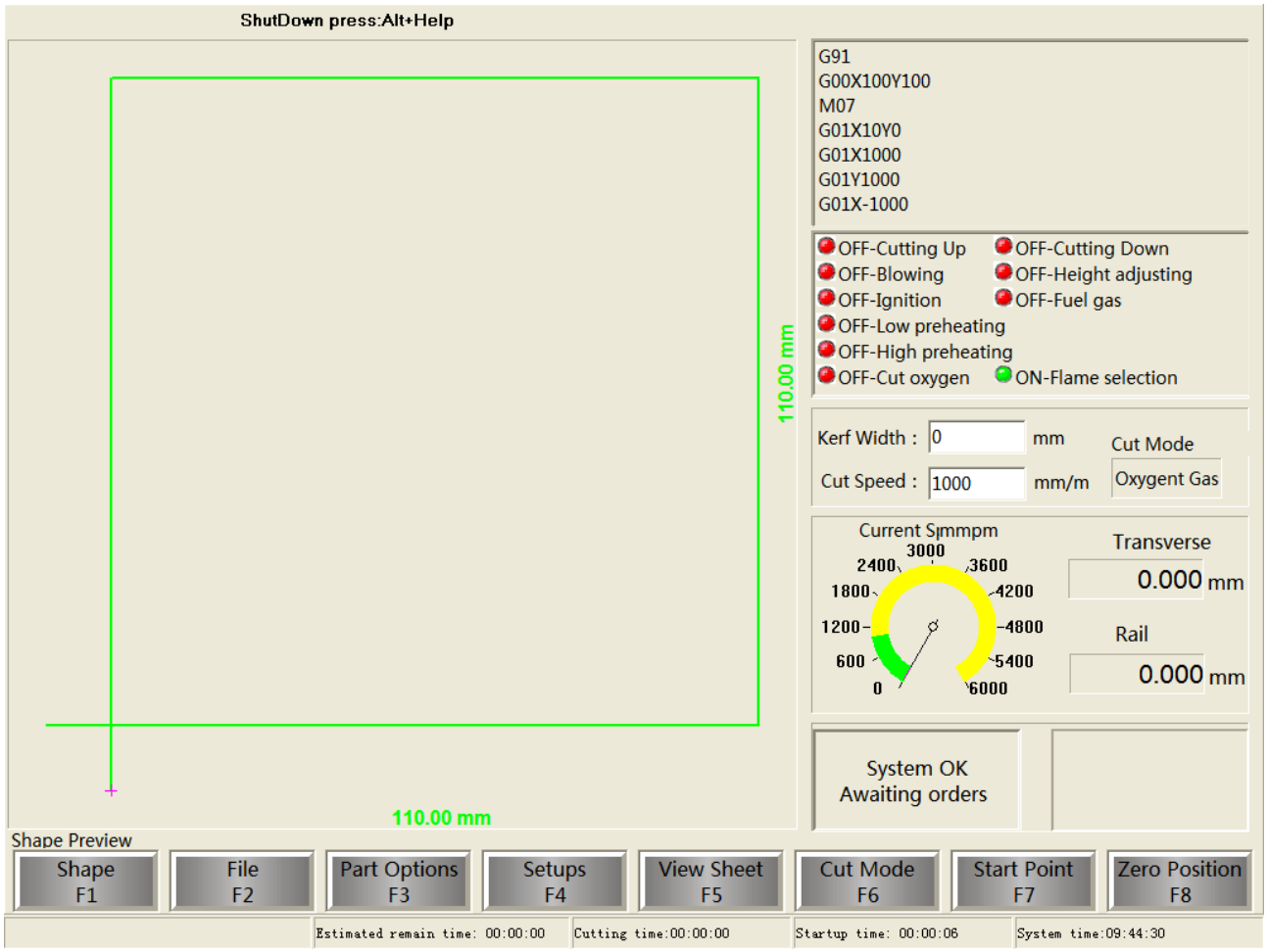


Figure 3.1.2 Main interface

The system provides rich functions and is easy to operate. Users may press a corresponding key under the main interface to operate the processing components and codes. Allocation of the functions keys under the main interface is shown in Figure 3.1.3:

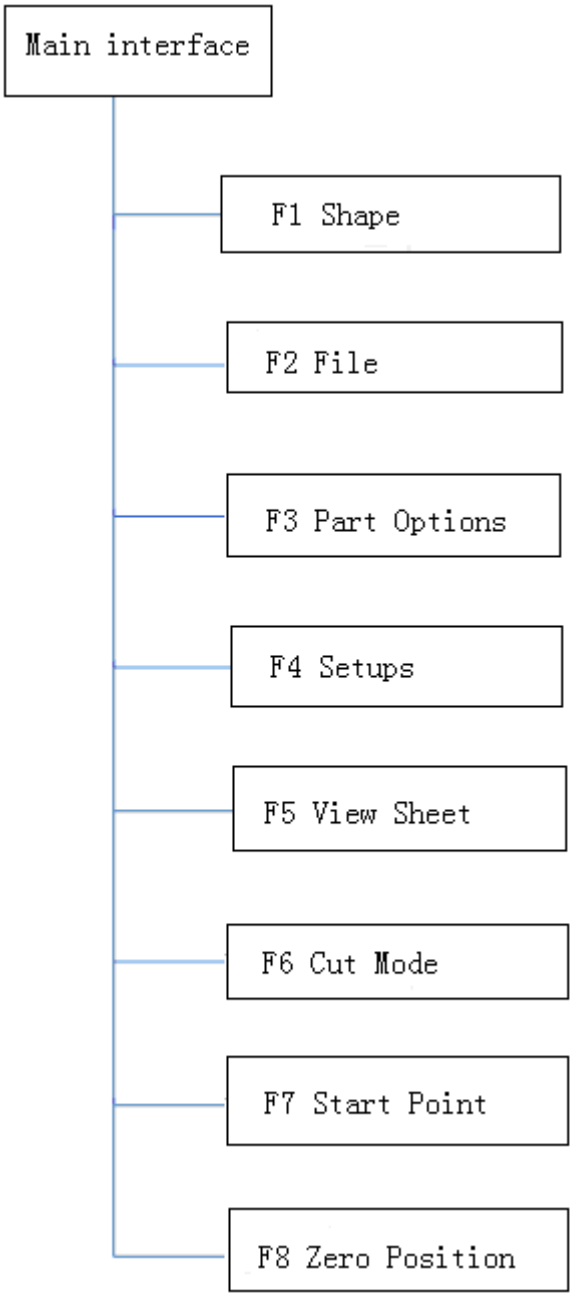


Figure 3.1.3 Structure and functions of main interface

Shape

Under the shape interface, you can select components from shape library, edit components codes, resort the components, or set the parameters of the selected shape; you can also achieve some simple functions such as shape nesting or guiding, which will be introduced in details in the following chapters.

Files

Under the Files interface, you can read files from controller or U-disk, create copy or delete a file, or preview the shape to be operated; it also provides the functions such as U-disk ejection and resumes part, which will be introduced in details in the following chapters.

Parts Options

This function allows you to mirror, rotate, align, validate, zoom or repeat the processing components. Details of the function will be introduced in the following chapters.

Setups

You can use this key to enter control related parameter settings, process settings and other settings. Details will be introduced in the following chapters.

View Sheet

To make shape to view sheet between components and plate

Cutting mode

To switch cutting modes among preview, oxygen gas, plasma, Dust Mark, and plasma mark.

Start point

To switch start point to cut shape among the original starting point of the shape and the points at the four corners of the components.

Zero Position

To set the current position as the reference origin, at this time you can see the position of the cursor in the preview window. This function also allows you to retrieve the origin of coordinates and clear position memory of the current processing.

3.2 Descriptions to the keys under main interface

3.2.1 F1 Shape

Press F1 to enter Shape menu under the main interface. The function under the Shape manager interface is as shown in Figure 3.2.1.1 below:

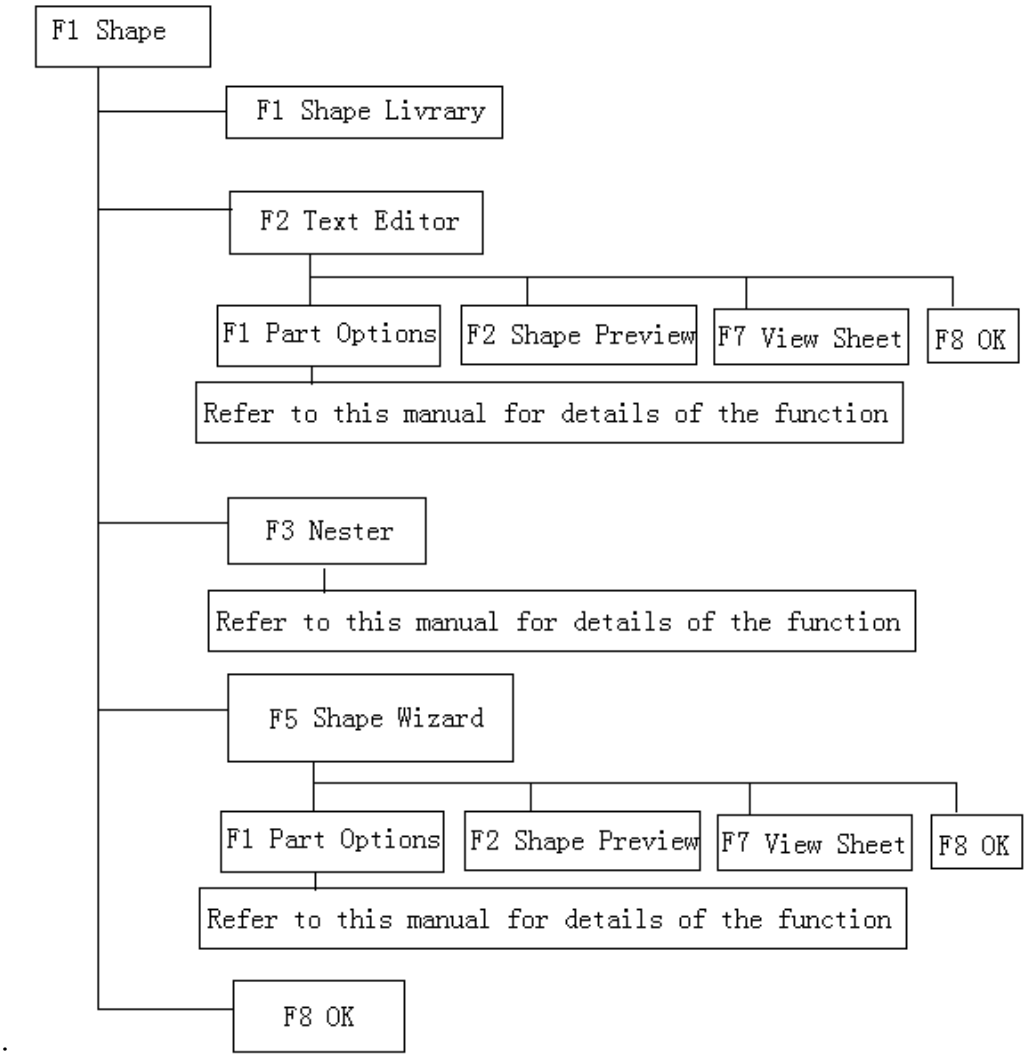


Figure 3.2.1.1 Structure and functions of Shape manager

3.2.1.1 Shape library

Under the main interface, press F1 to enter Shape manager interface, which provides 37 frequently used Shapes and one testing shape, as shown in Figure 3.2.1.1.1 below:

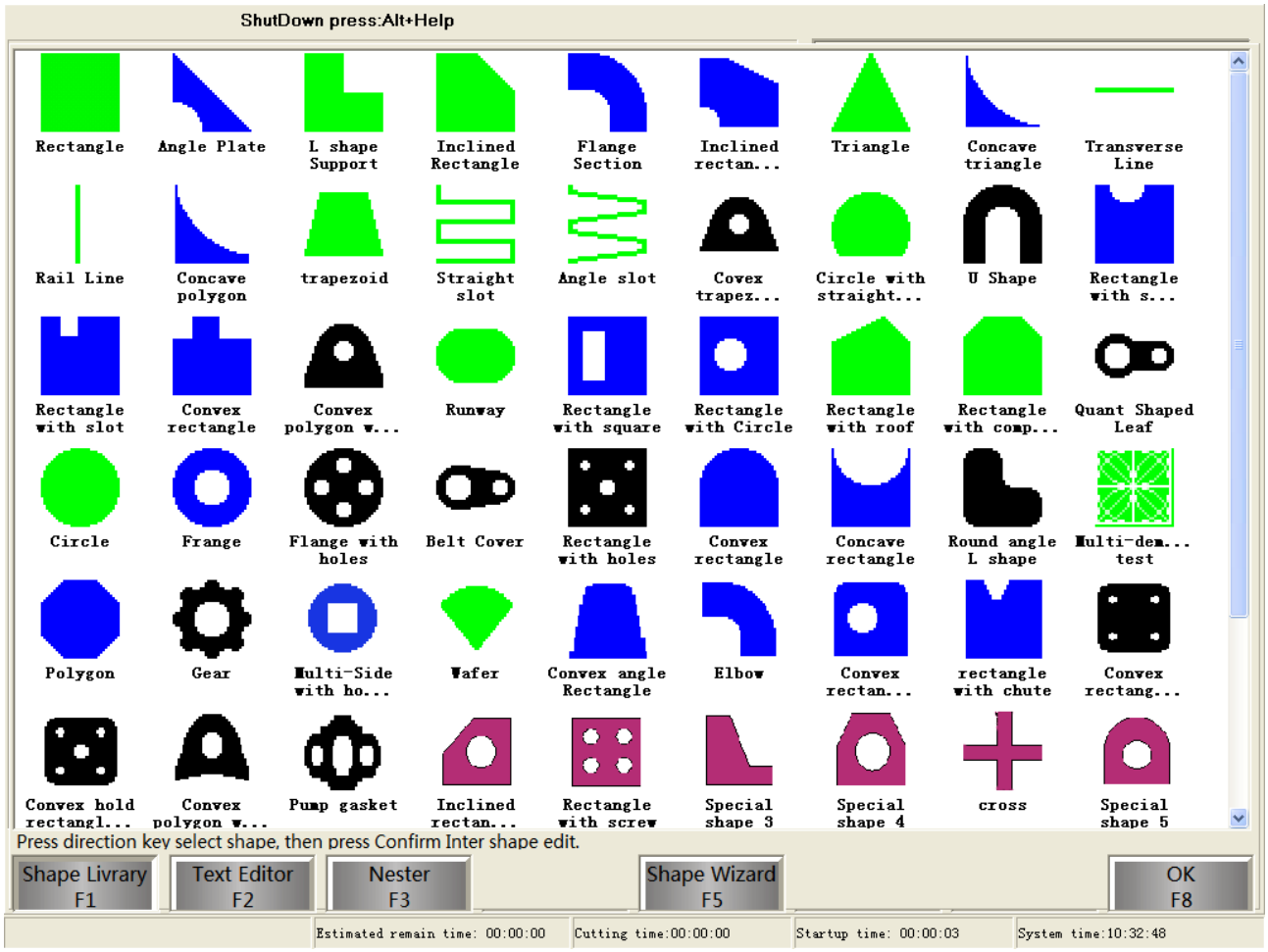


Figure 3.2.1.1.1 Shape library

Under this interface, you can press ←, ↑, → or ↓ to select a shape, and then, press F8 to confirm and enter the selected shape. An example is shown as follow:

Select the convex polygon with hole and press F8 to confirm, as shown in Figure 3.2.1.1.2 below:

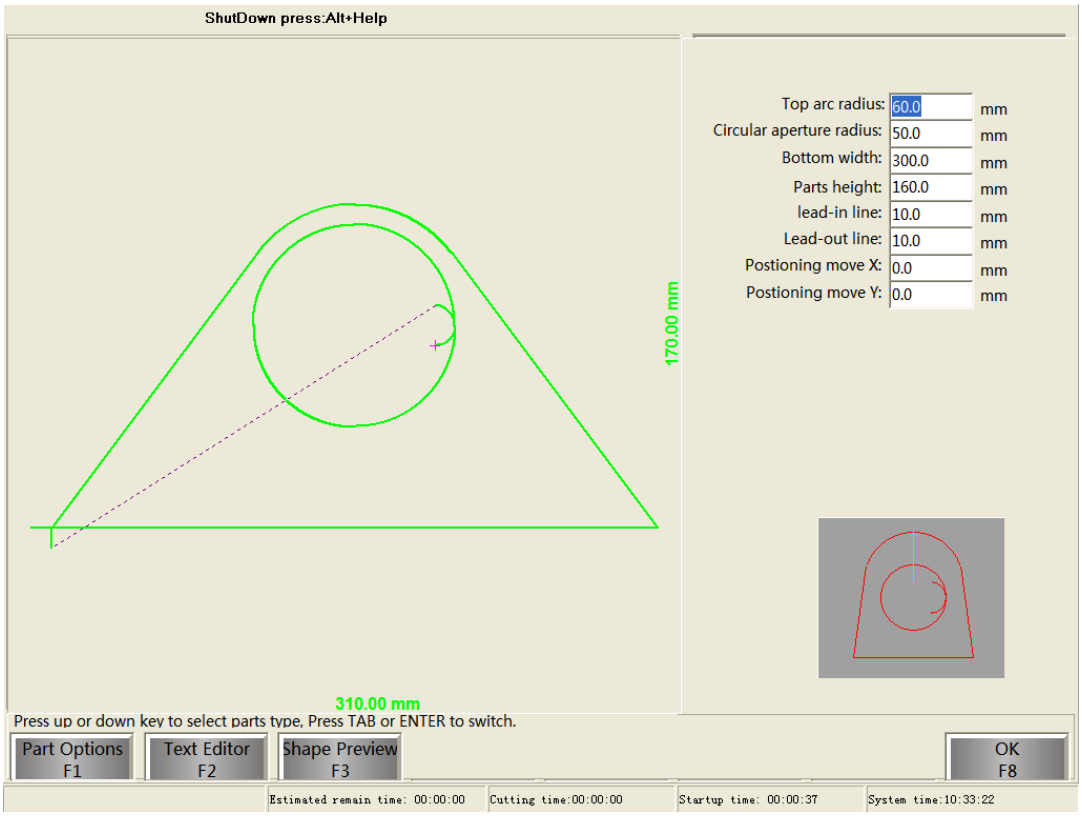


Figure 3.2.1.1.2 Shape

This shape can be seemed as composed of a half rectangle, an isosceles trapezoid, an arc and a circle. User may also set the parameters to get a different processing shape. If the hole is not required, the radius of the circle can be set as zero; if the rectangle is not required, the height of the rectangle can be set as zero. The radius of the arc at the top must be larger than the radius of the circle. After setting the parameters, press the function key F3 to preview or Tab to preview automatically. If the parameters are not correct, the system will prompt error, otherwise, press the function key F8 to confirm processing the shape, then the processing file will be saved in PC and the system enters Auto interface automatically, under which users may use this processing file directly. If ESC is pressed, the processing file in the system will remain unchanged and the setting is not applied. Under this interface, press the function key F1 to enter part options interface, under which users can perform the operations such as rotate array, rotate, zoom-in and mirror. Press F2 to view the code of the component, in such case the default file is the current file, and you can edit or preview the Shape of this file.

Perforation cutting

As for some simple shapes such as rectangles and triangles, you will find an additional option in the interface named "Part type", with two parts cutting types optional: Perforation and Section. You can cut a rectangular hole (perforating inside the rectangle), or cut a rectangular section (perforating outside the rectangle). Press Tab to switch to "Part type" option, and press ↑ or ↓ to switch between two types. After the Shape is modified, you can

preview it.

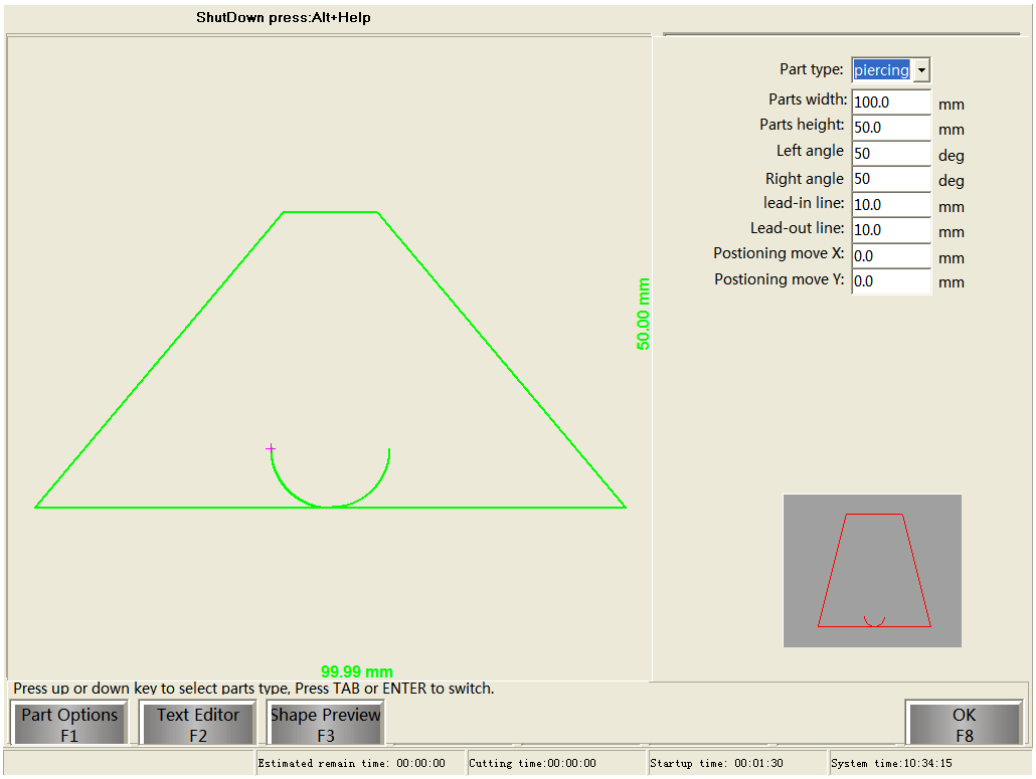


Figure 3.2.1.1.3 Perforation shape

Tips for operation

The parameter setting in the shape library is conditional according to the characteristics of the Part. As shown in the figure, the radius of the circle cannot be larger than the radius of the arc outside it or the height from the center of the circle to the bottom of the trapezoid, and the length of the bottom of the trapezoid cannot be smaller then 2 times of the radius of the arc at top. If the parameters exceed the limit, the shape will not be composed correctly. After setting the parameters, press F3 to preview or Tab to preview automatically, if the parameters exceed the limit, the system will prompt.

Take the parameter setting interface of the “convex polygon with a hole” as an example, if the radius of the circle is modified to 100 and F3 is pressed, system will prompt “Arc radius too large” and the parameter will return to original value automatically.

The option “Inlet arc radius” is added in the interface to avoid perforating at the edge of the part which may influence processing quality. Some shape requires the inlet line, which is used to convenience the operation, and make sure the cutting quality is not influenced. The options “Idle move X” and “Idle move Y” can be found in all shapes in order to convenience the user to set the original place of the cutting torch.

Press Tab to select a parameter to set while setting the parameters.

3.2.1.2 **Text Editor**

When a shape is selected under shape manager interface, press F2 to enter Code editing interface, as shown in the figure below:

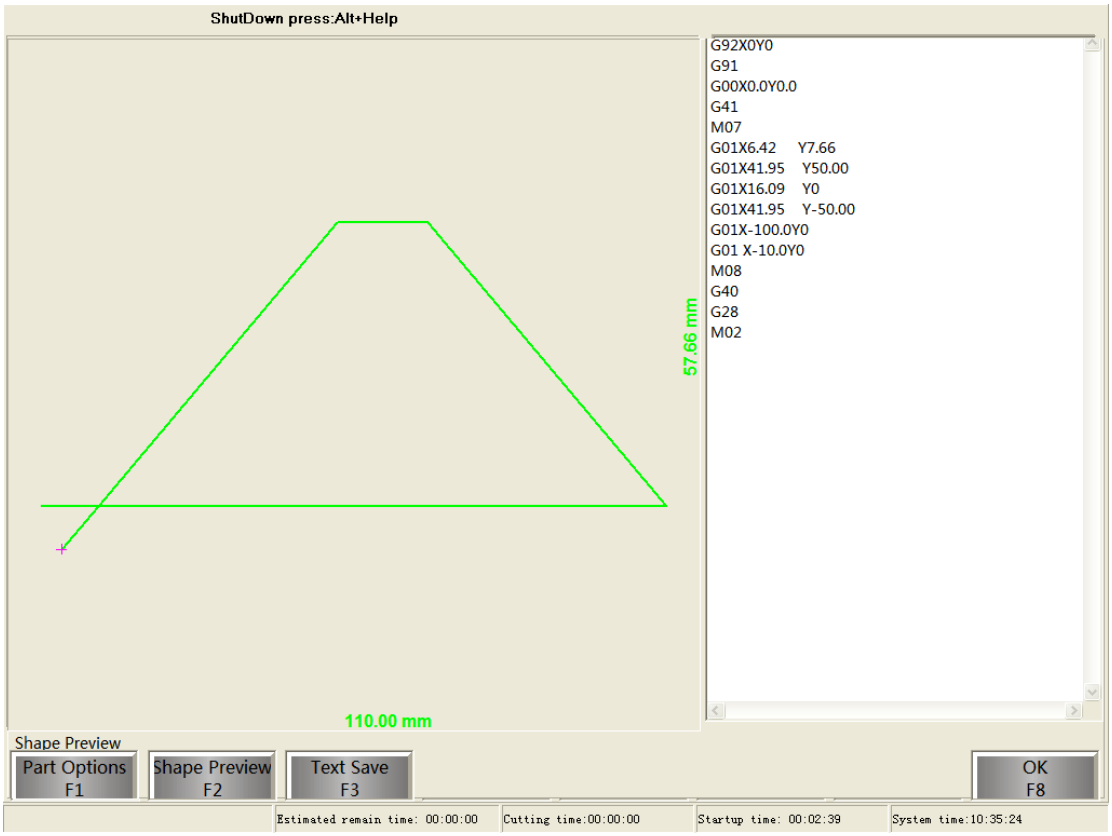


Figure 3.2.1.2.1 Code editing

Under this interface, press F1 to enter Part options interface, under which you can perform the operations such as rotate array, rotate, zoom-in and mirror. After modifying the code, press F2 to view the shape. If you want to save the modified code, simply press F3. Then press F8 to confirm the shape and return to main interface, or press ESC to return to main interface without modifying the shape.

3.2.1.3 **Nester**

When a Shape is selected under Shape manager interface, press F3 to enter Shape nesting interface, as shown in the figure below:

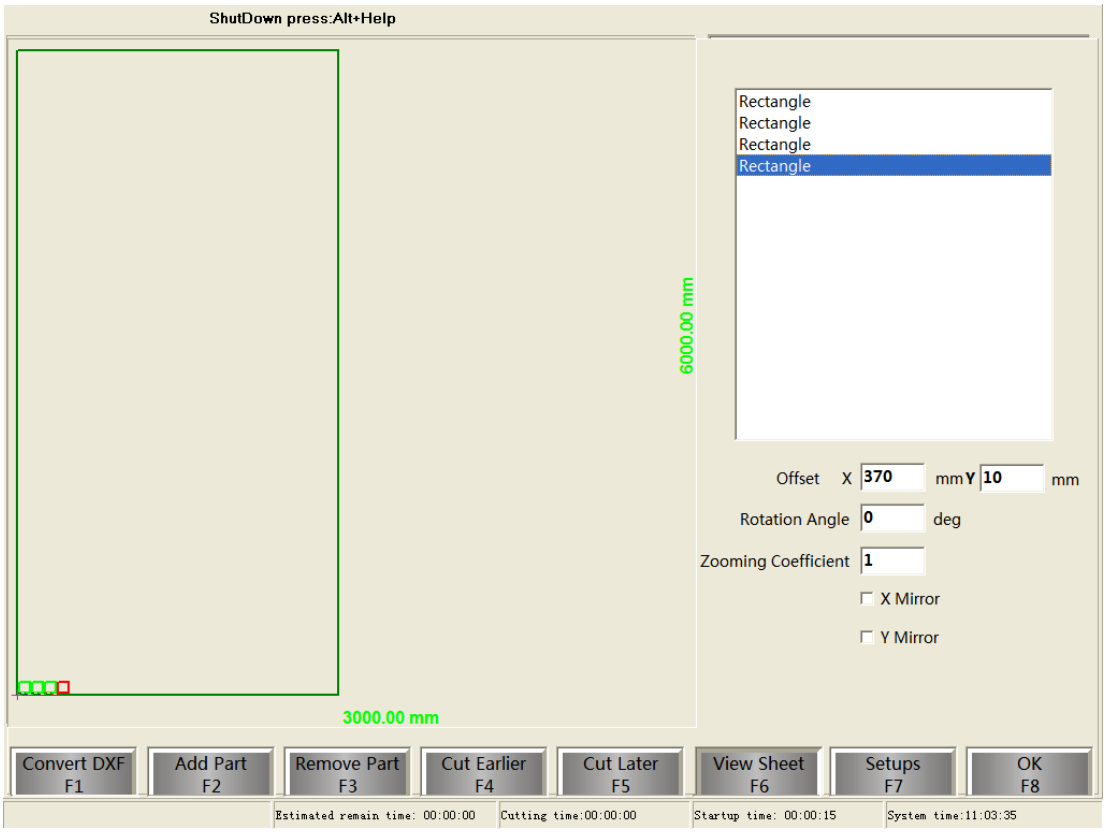


Figure 3.2.1.3.1 Shape nesting

This function provides manual nesting and auto nesting and allows the user to put the different shapes together for cutting, which greatly improves the utilization rate of the materials.

Structure and functions of shape nesting interface are shown in Figure 3.2.1.3.2 as below:

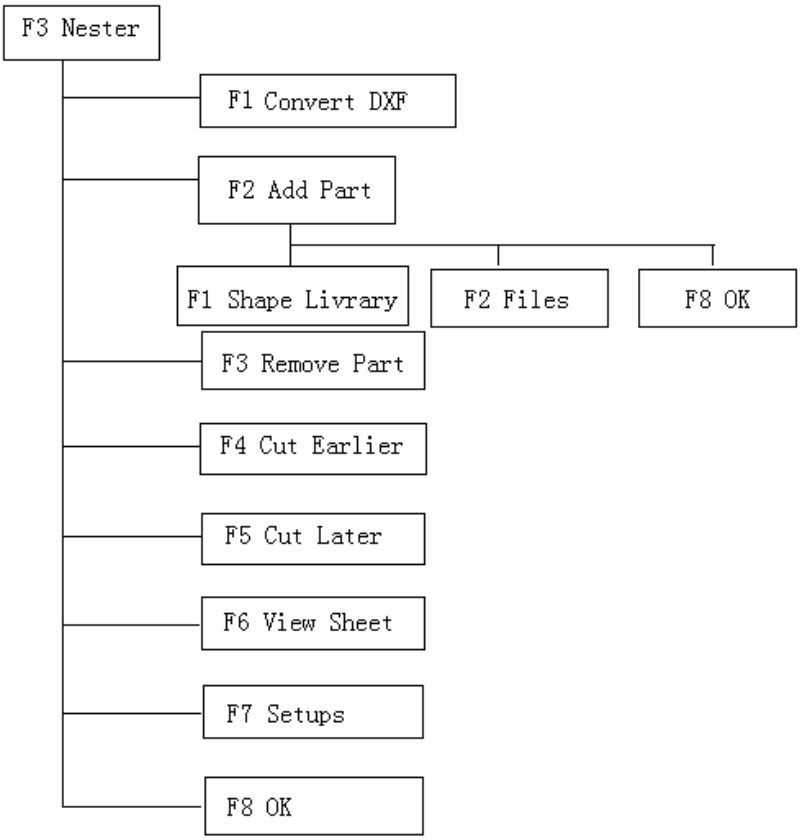


Figure 3.2.1.3.2 Structure and functions of Shape nesting

Convert DXF

You can add DXF parts in nesting plan. As the DXF file is conditional, you need to set it manually and so a mouse is required.

Add part

You can press this key to add part into the nesting plan. The required shapes can be obtained from the shape library, U-disk or local disk.

Remove part

To remove the selected part from the nesting plan.

Cut earlier

To adjust part cutting order ahead.

Cut later

To adjust part cutting order behind.

View sheet

To switch between all nesting parts and ingle part display; when displaying a single part, all nesting parts are displayed in the display area.

Setups

Set relevant parameters of the Shape nesting.

OK

Stop nesting and return to main interface, and take the result of nesting as the cutting program.

The left window is the nesting display area, the right up window is part selecting area and the right down window is part editing area. Modifications to the part will be displayed in the nesting display area in real time. Press Tab to switch among the three areas. The area currently activated will be highlighted by a blue frame, in such case the parts selected can be moved by pressing the arrow keys.

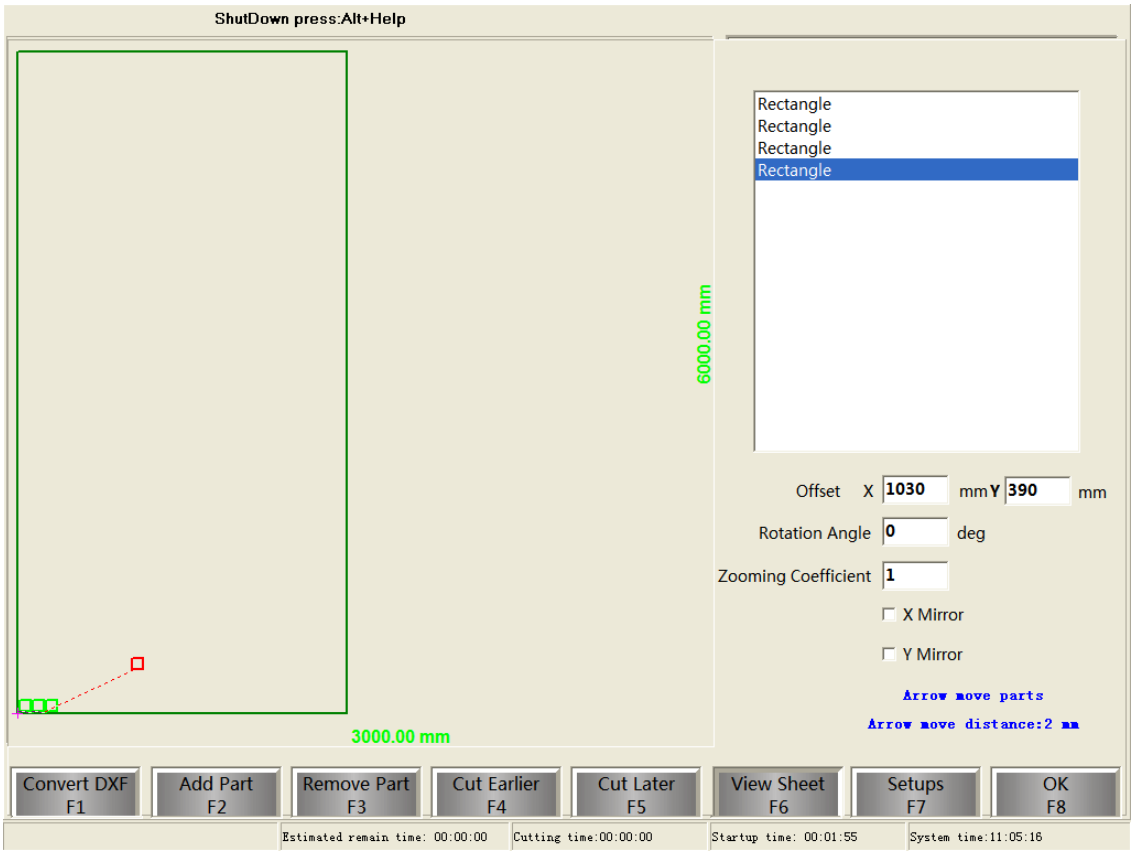


Figure 3.2.1.3.3 Moving Shape manually

Convert DXF

The DXF converting interface requires a mouse to operate. When a DXF file is loaded, the system will automatically inspect whether the shape requires auto closing. In case of a closed shape, the slotting compensation setting is required. Click Slotting compensation on the tool bar, then select the closed curve requiring compensation, the system will prompt a message to ask if you need left compensation or right compensation, and then the setting completes if you select any one. After setting, close the window to go back to nesting window.

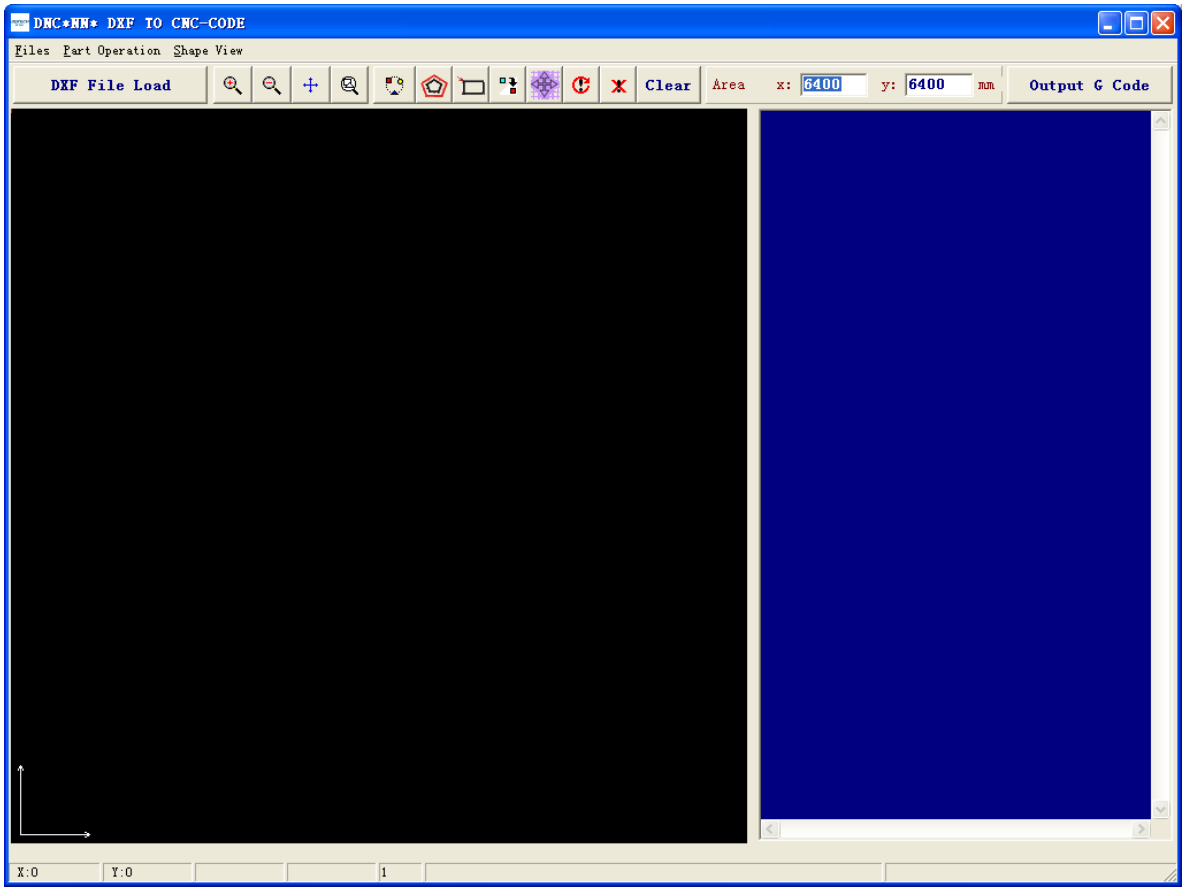


Figure 3.2.1.3.4 DXF converting

3.2.1.4 **Shape Wizard**

Under Shape manager interface, press F5 to enter Shape guide interface, as show in the figure bellow:

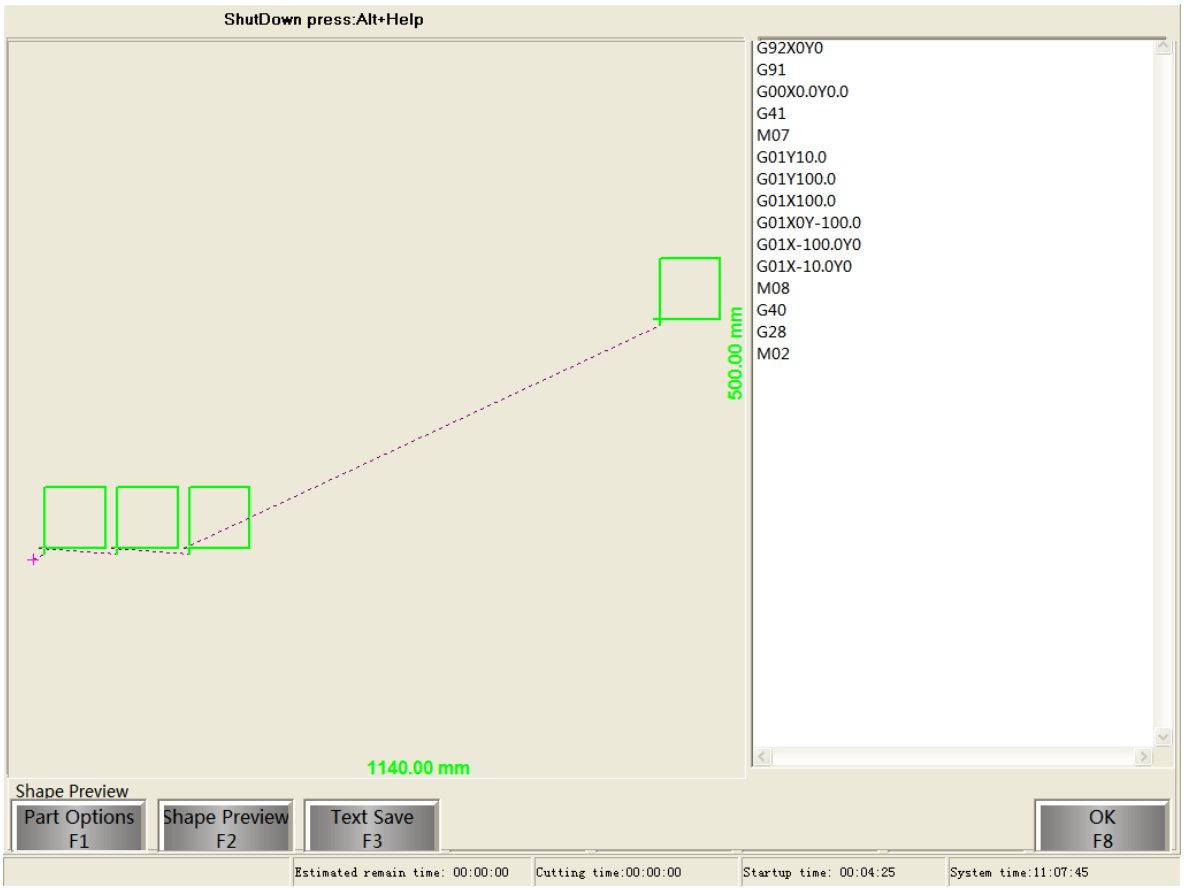


Figure 3.2.1.4.1 Shape wizard

The Shape wizard is a tool used to edit code of part.

Part Options

To rotate array, rotate, zoom-in or mirror the Shape.

Shape preview

To preview the Shape whose code is modified.

Text Save

To save the modified code.

OK

To complete editing and return to main interface, and take the current Shape as the cutting program.

3.2.2 F2 Files

Under main interface, press F2 to enter Files interface, as shown in the figure below:

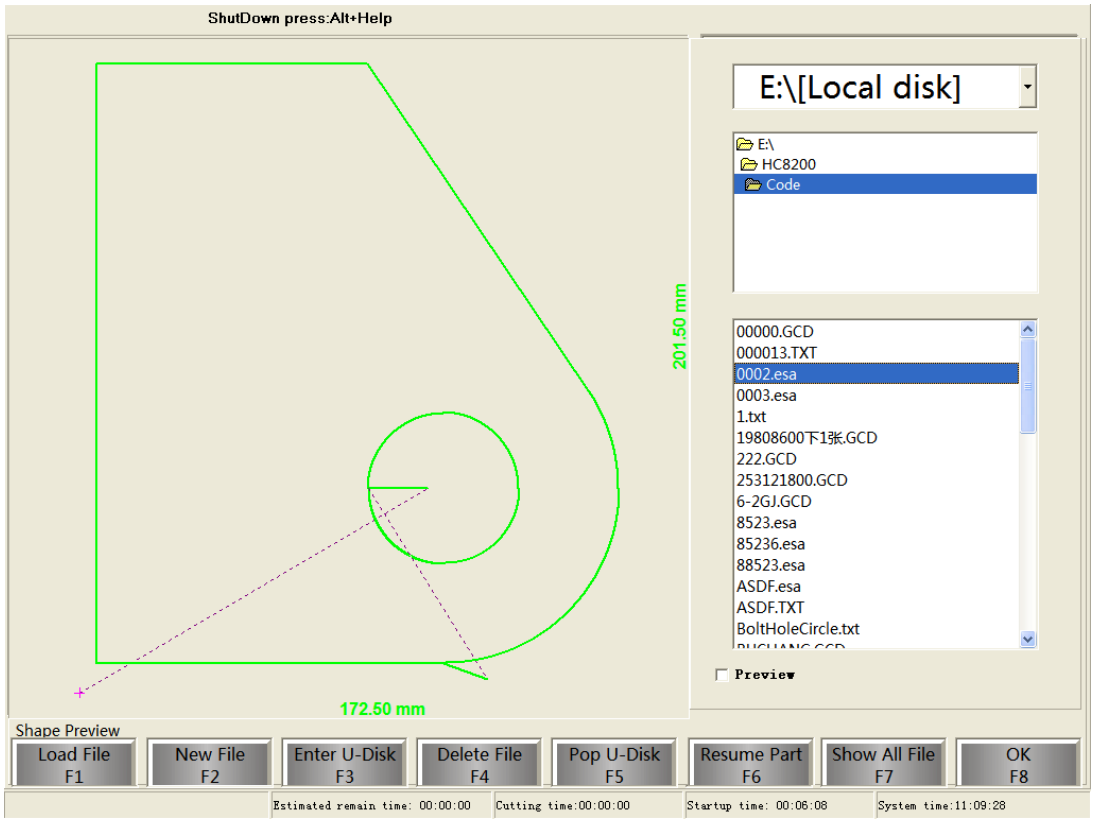


Figure 3.2.2.1 File management interface

The Structure and functions of files interface are as shown in the figure below:

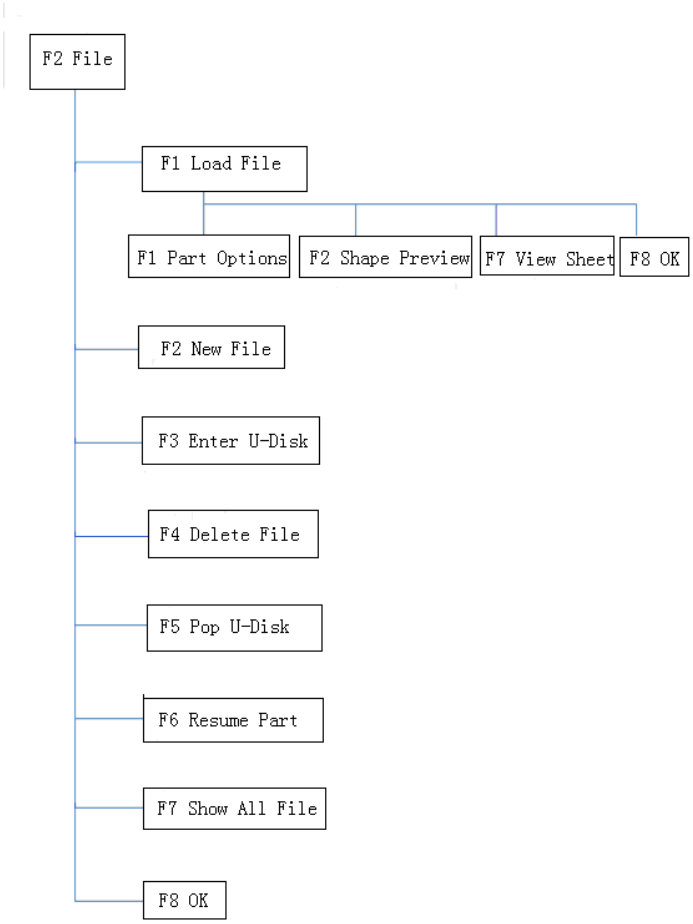


Figure 3.2.2.2 Structure and functions of files interface

The left of the files windows is the preview pane of the current shape, which displays the shape of the corresponding file in real time. The right of pane displays the path of the processing file; the right up pane displays the driver disk, right center displays the folder, and right down display the file. You can press Tab to switch among different panes. In the same pane, you can press ↑ and ↓ to select an item.

Load file

When a file is selected, press F1 to load the file and enter code editing interface. The Code editing interface provides the functions including Edit code, Part options, Shape preview and View sheet. See Code editing interface for details.

New File

Create a new file.

Enter U-Disk

To copy a file is to copy the file in the U-disk into the local disk, so you need to insert a U-dick before copying. Under the Files interface, press F3 to enter Copying file interface, as shown in the figure below:

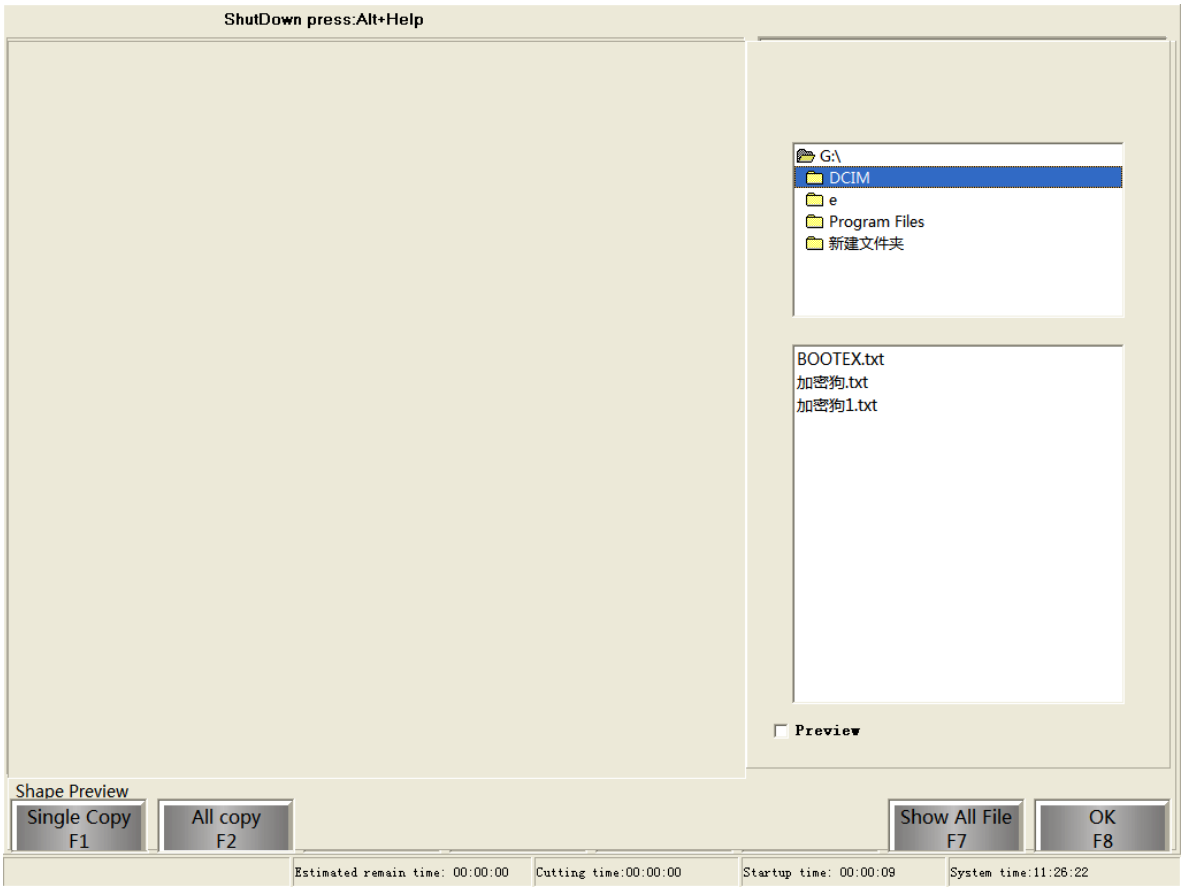


Figure 3.2.2.3 Enter U-Disk

Under Copying file interface, you can see the directory of the U-disk and the file list. Press Tab to switch among different panes, and under the same pane, press ↑ and ↓ to select an item. After a file is selected in the right, press F1 to copy the file to E: of the local disk. Press F2 to copy all. Press F7 to switch between Display all

files and Display files of specified format in the right. Press F8 to OK Press ESC to exit.

Delete file

To delete the selected file.

POP U-disk

Remove the inserted U-disk in a safe way to protect the U-disk.

Resume Part

To resume the part under break point memory or power failure protection, e.g. the user pauses the process and saves the part during the cutting and start cutting another part, you can press this key to recover the saved part; or in case of power failure during the cutting, if a UPS is provided, the system will save the part automatically after receiving power alarm, and when power supply resumes, you can press this key to recover the component before power failure. Note: the break point file is saved according to time. See the figure below:

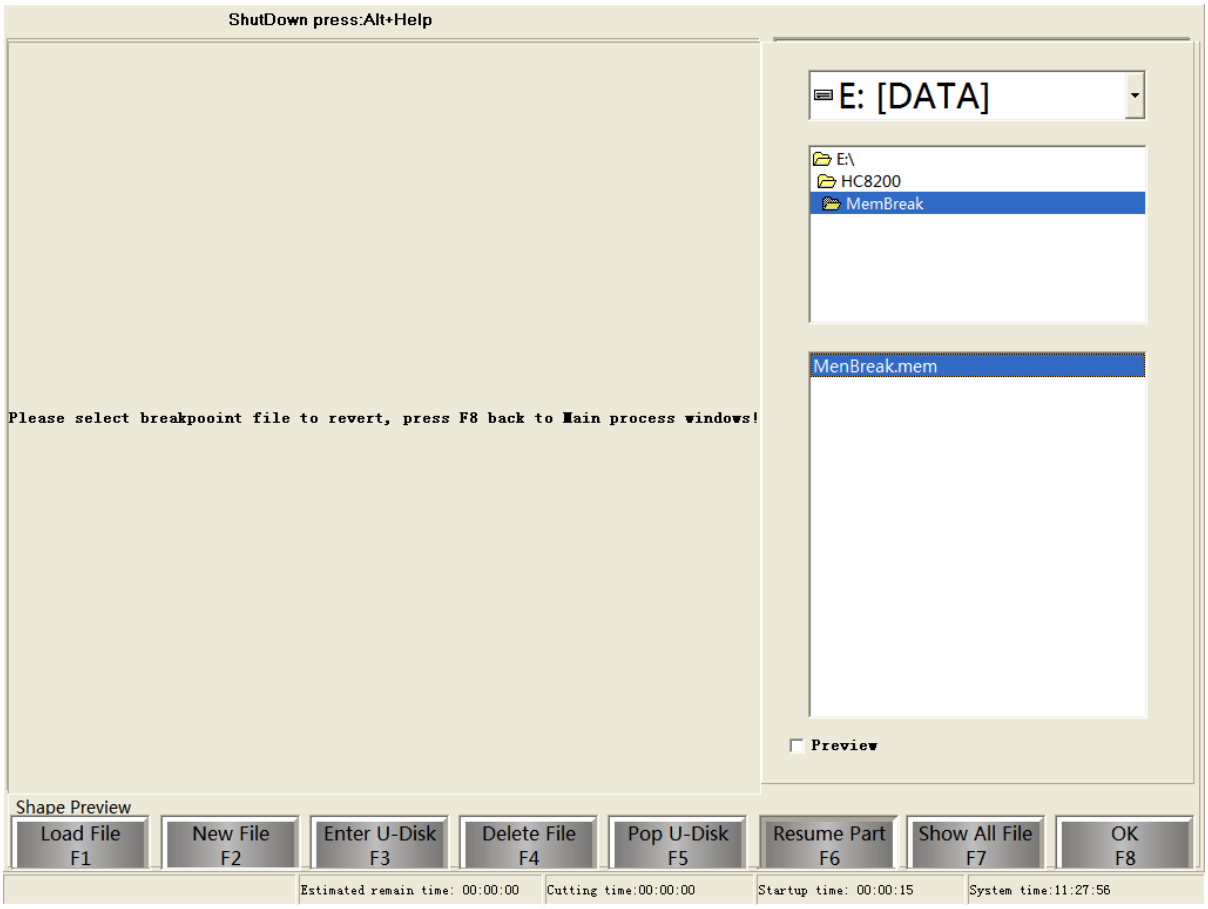


Figure 3.2.2.4 Break point recovery

When a break point file is selected, press F8 to return to Pause cutting interface.

Show All Files

When the files in the folders are not all displayed, press this key and all files in this folder will be displayed, and press it again to display the specified files only.

OK (Confirm and return)

OK- Confirm and return to main interface.

Note: the code of the processing file for nesting downloaded from the U-disk can only be G or EIS, or DXF file. The system doesn't support other types of files.

3.2.3 F3 Part Options

Under this interface you can manage the processing parts. Under the main interface, press F3 to enter parts options interface, as shown in the figure below:

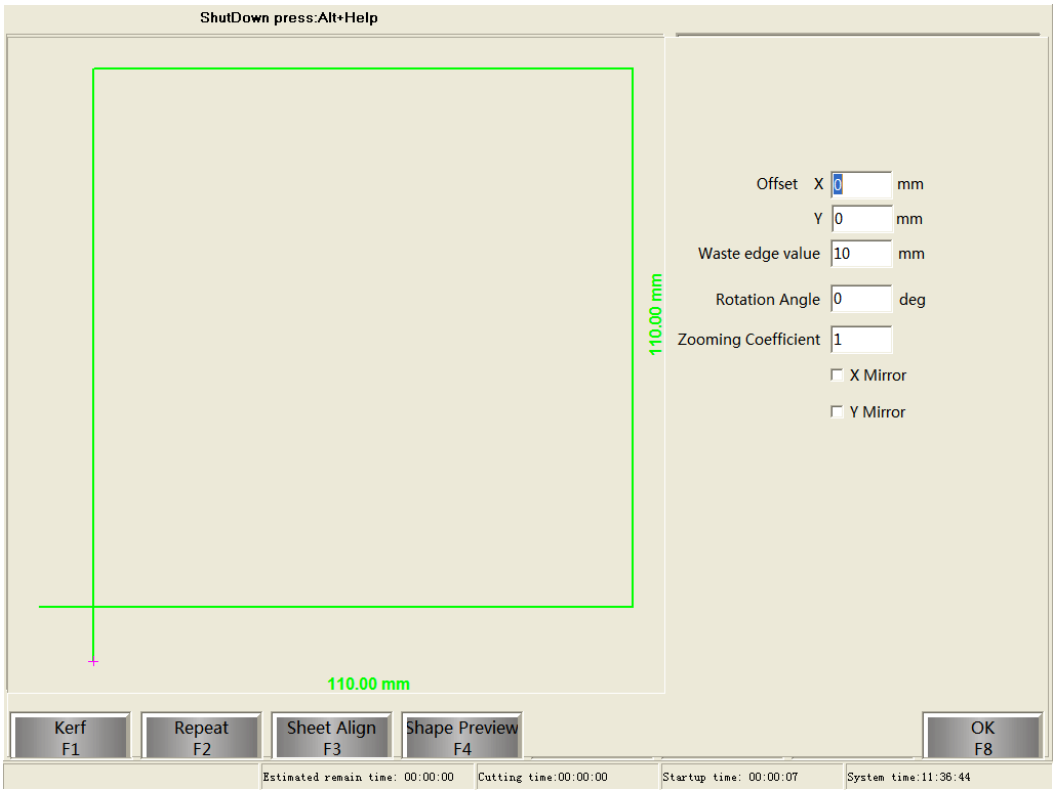


Figure 3.2.3.1 Part manager

The Structure and functions of part manager interface:

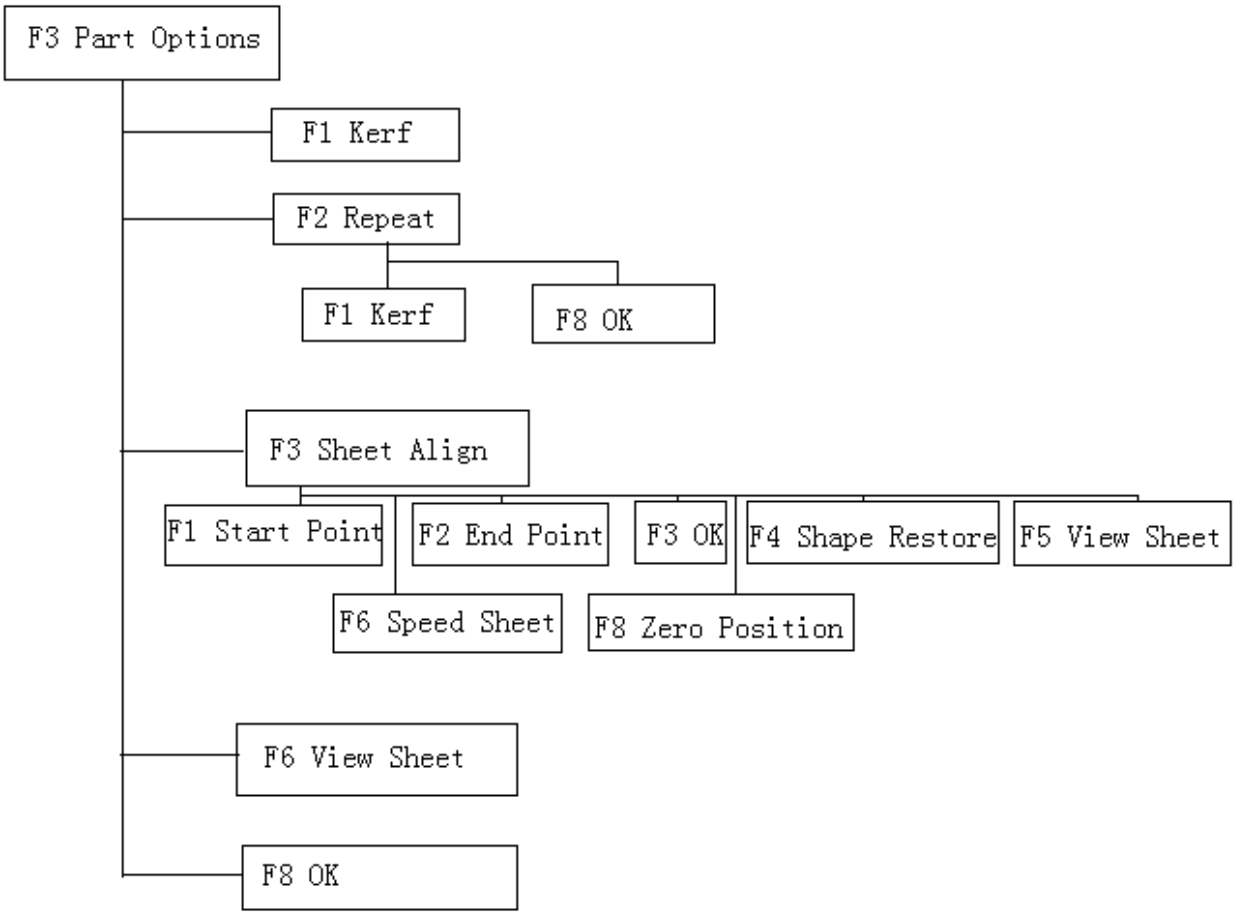


Figure 3.2.3.2 Structure and functions of Parts manager

The left of the Parts manager interface can display the parts in real time; the right of the interface displays the parameters of the parts and you can modify the parameters; the function keys are at the bottom of the interface. You can press Tab to switch and modify the parameters of the parts and to rotate, mirror or zoom the Shape.

Offset

The offset between the parts.

Rotate angle

To rotate the processing Shape anticlockwise at a certain angle.

Zoom coefficient

To zoom in or zoom out the Shape according to actual size; zoom in when the value is >1, and zoom out when it is between 0 and 1.

Mirror

X mirror is to make a duplicate based on Y axis symmetrically, and similarly Y mirror is to make a duplicate based on X axis symmetrically, and XY mirror is to make a duplicate based on a straight line which forms a 45° angle with X axis or Y axis symmetrically.

Waste edge value

To specify the waste width between components; the waste edge values of X axis and Y axis are the same.

After modifying the parameters, press Tab and once the cursor exits the parameters modified, the Shape after modification will be displayed immediately, as shown in the figure below:

Figure 3.2.3.3 Parts Shape

There are five function keys under Parts manager interface. The details are as follow:

3.2.3.1 **F1 Kerf**

If the kerf value is set under the main interface, you can press this key under the Parts manager interface to display kerf, as shown in the figure below:

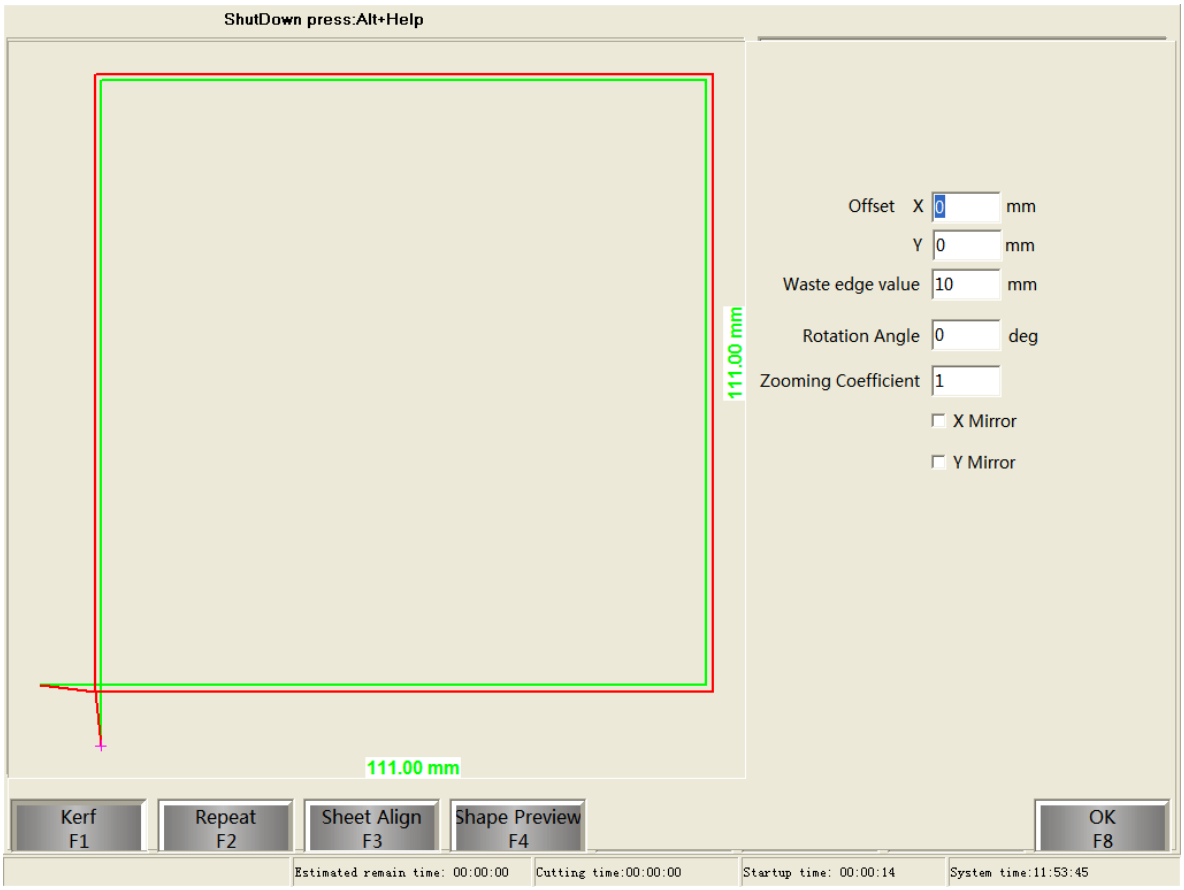


Figure 3.2.3.1.1 Kerf display interface

Press this key again to cancel display.

3.2.3.2 **F2 Repeat**

The controller provides two repeat methods: straight and stagger.

Straight Repeat

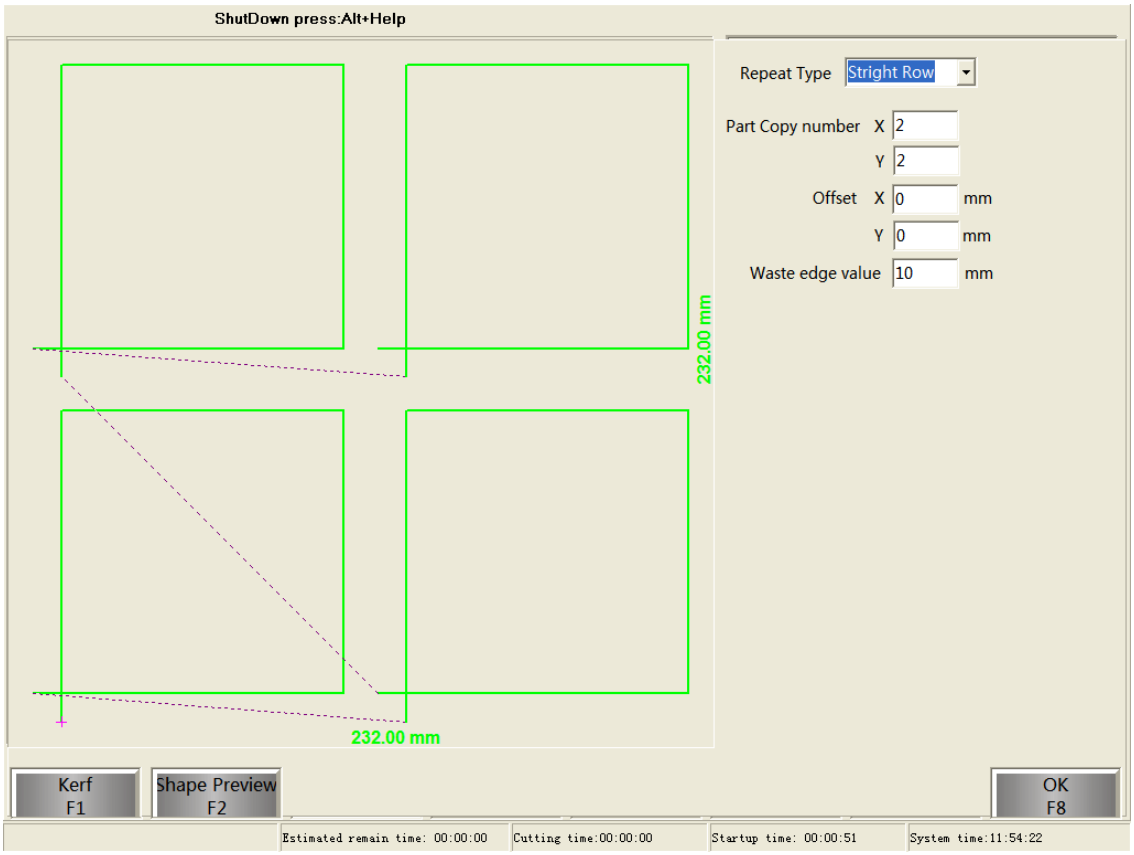


Figure 3.2.3.2.1 Straight

Stagger Repeat

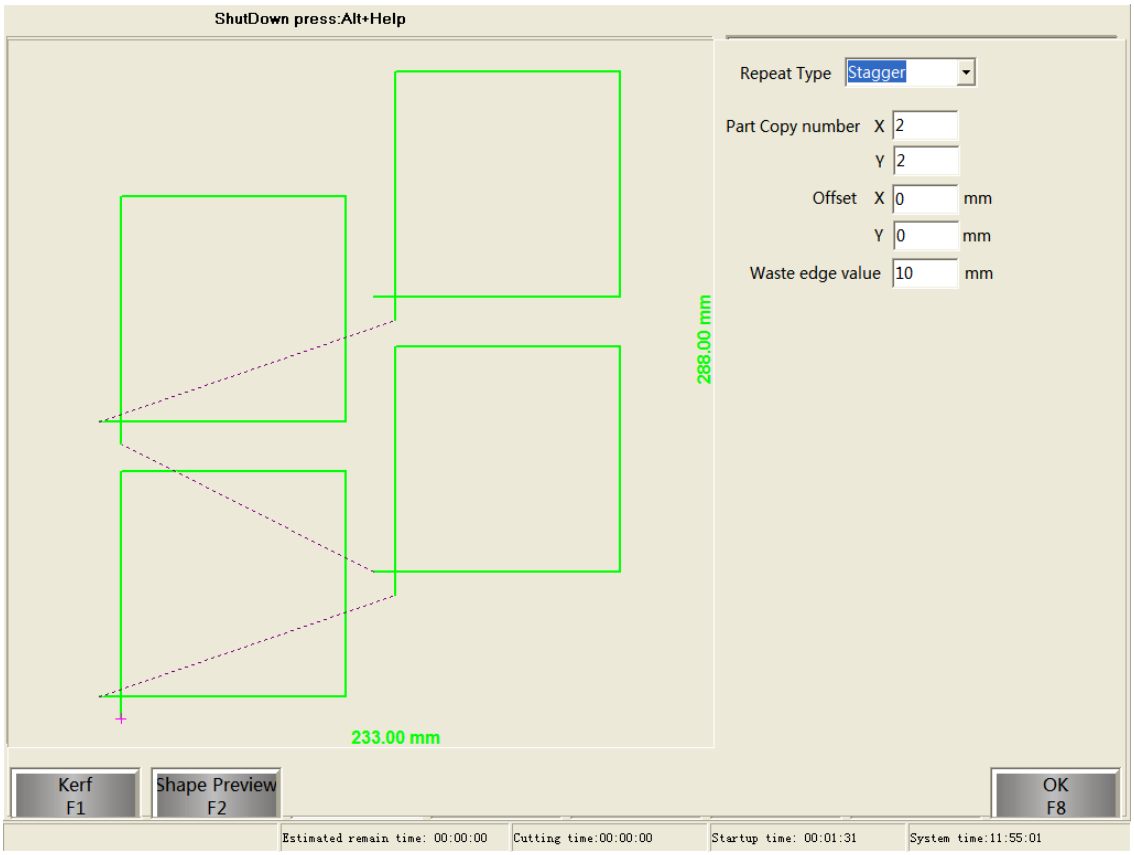


Figure 3.2.3.2.2 Stagger resorting

Parameters under resorting:

Resorting type

To select resorting type between straight resorting and stagger resorting.

Number of copies

To specify the lines and rows.

Offset

To specify the offset between the resorted components or component complexes.

Waste edge value

To specify the waste width between components; the waste edge values of X axis and Y axis are the same.

3.2.3.3 Sheet Align

This function allows you to calibrate the relative positions of the shape and the steel plate in order to maintain a reasonable position of the two. The align n interface is shown in the figure below:

Figure 3.2.3.3.1 Plate Align

The principle of Align:

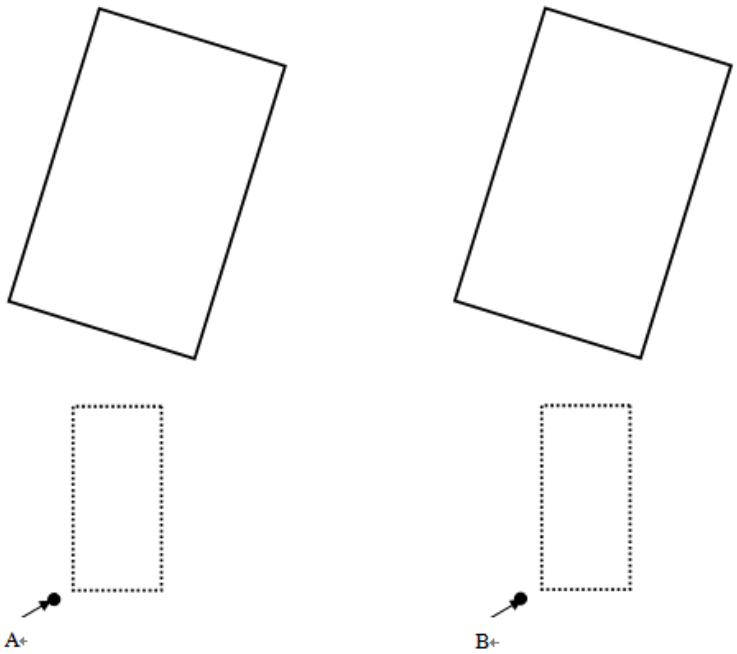


图 1 图 2

Figure 1 Figure 2

Figure 3.2.3.3.2 Principle of plate align

1）In Figure 1 of the above figure, the large frame (solid line) is the steel plate, and the small frame (dashed line) is the Shape to be cut. Point A is the start point of the cutting torch, and if cutting according to the position as shown in Figure 1, part of the shape outside the cutting area will not be cut, and if moving the start point of the cutting torch to the center of the steel plate as shown in Figure 2, the unreasonable use of the steel plate will obviously cause a waste.

2）In this case, without moving the steel plate, you can simply calculate the angle of inclination of the steel plate and incline the processing Shape accordingly to achieve a more efficient cutting.

Steel plate calibration method 1: the calibration reference edge is X axis, and the direction is positive.

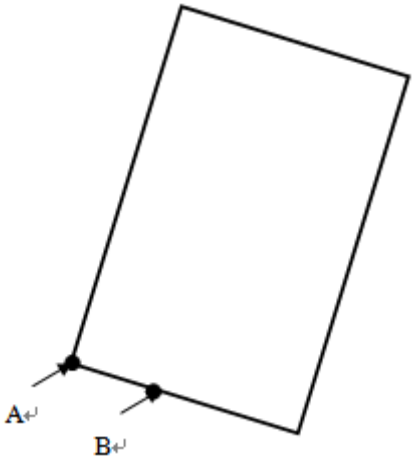


Figure 3.2.3.3.3 Align with X axis as the reference axis

1) As shown in the above figure, point A is the start point of the cutting torch; move the cutting torch to point A and press F1 to confirm, point A will be set as the start point of calibration; then press direction key to move to point B and press F2 to set it as the end point of the calibration, thus the angle of inclination of the steel plate will be calculated, and finally press F3 to confirm. If the align angle is set to be saved in settings, the angle will be saved for next use.

2) In such case the Shape will be rotated at an angle accordingly. The positions of the Shape to be processed and the steel plate are as follow:

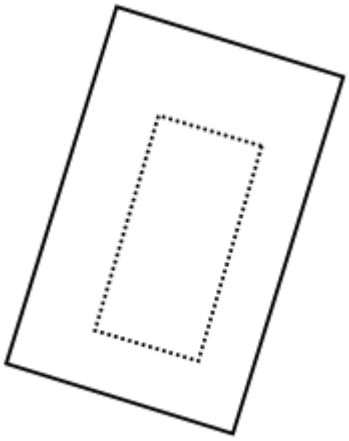


Figure 3.2.3.3.4 Result of align with X axis as the reference axis

3) If the steel plate is inclined to left as shown in the figure below, then the align method is as follow:

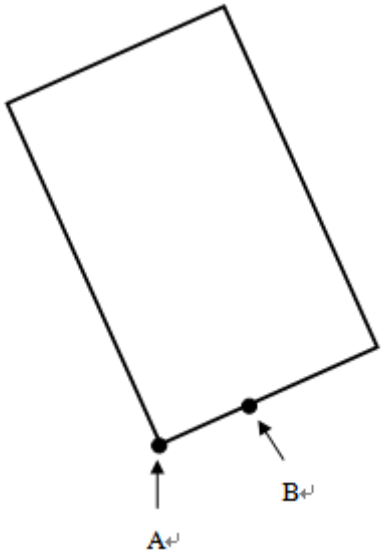


Figure 3.2.3.3.4 Right inclination align with X axis as the reference axis

Similarly, move the cutting torch to point A and press F1 to set point A as the start point of the align; then press direction key to move to point B and press F2 to set it as the end point of the calibration, thus the angle of inclination of the steel plate will be calculated, and finally press F3 to confirm. The positions of the Shape to be

processed and the steel plate are as follow:

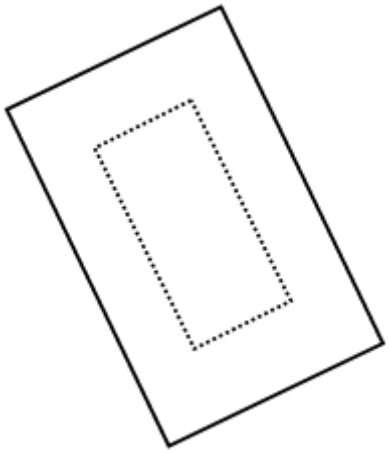


Figure 3.2.3.3.5 Result of right inclination align with X axis as the reference axis

Steel plate aligns method 2: the align reference edge is Y axis.

The principle of this method is the same with method 1, only the reference axis is different. Sometimes the steel plate on X axis is too short, in this case we can select to calibrate based on Y axis. Before align, select the base axis and direction of the align and then start calibrating. Set the starting point and end point according to method 1.

Steel plate align method 3: input align angle directly

As shown in the figure below:

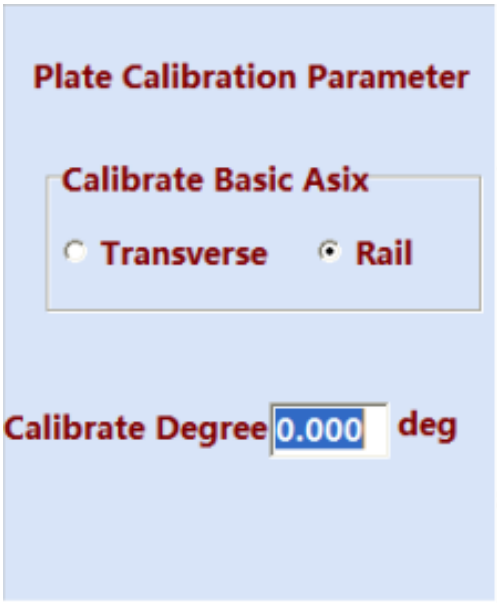


Figure 3.2.3.3.6 Input align angle

3.2.3.4 View sheet

To switch between overall shape display area and single part.

3.2.3.5 **OK (confirm and return)**

Confirm and return to main interface and use the current Shape as the cutting program.

3.2.4 F4 Setups

The system setting main interface where you can set main parameters, as shown in the figure below:

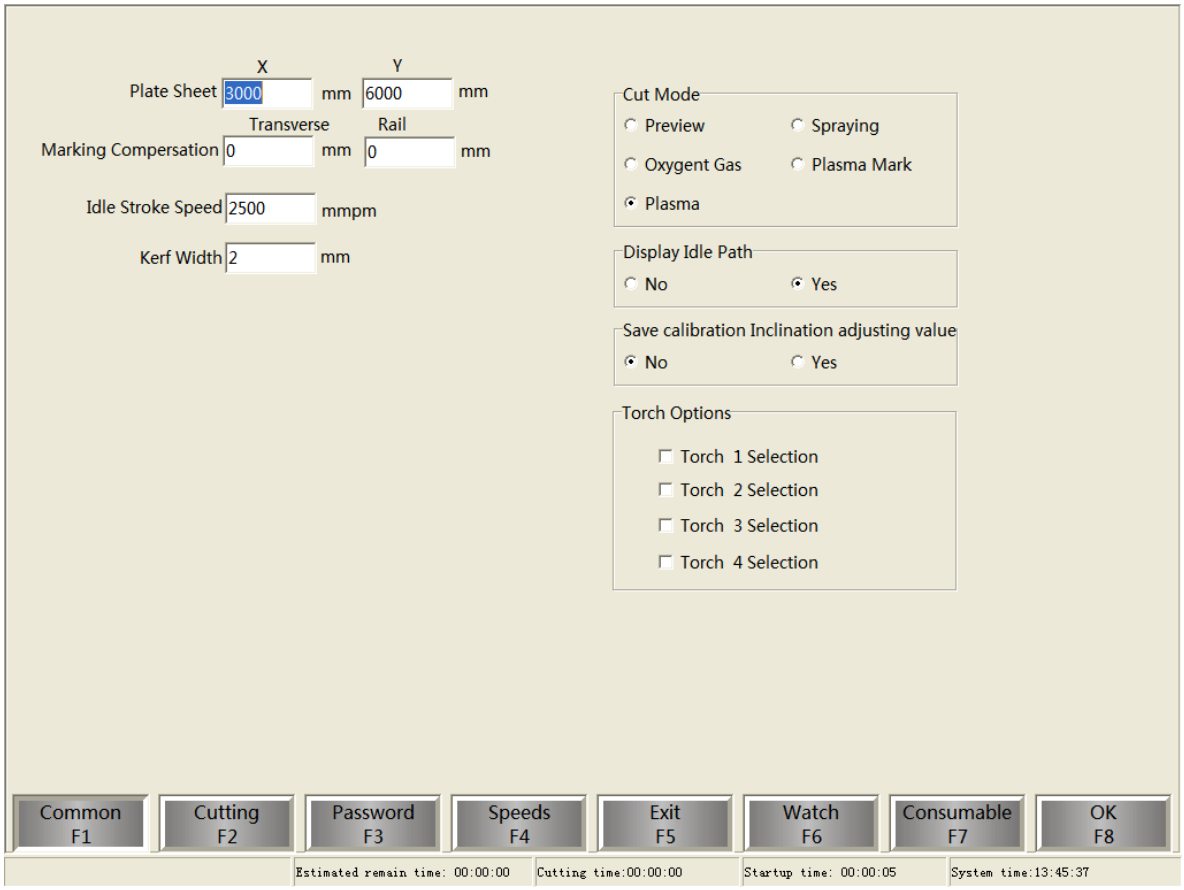


Figure 3.2.4.1 System Setups interface

Structure and functions of the system setting is as follow:

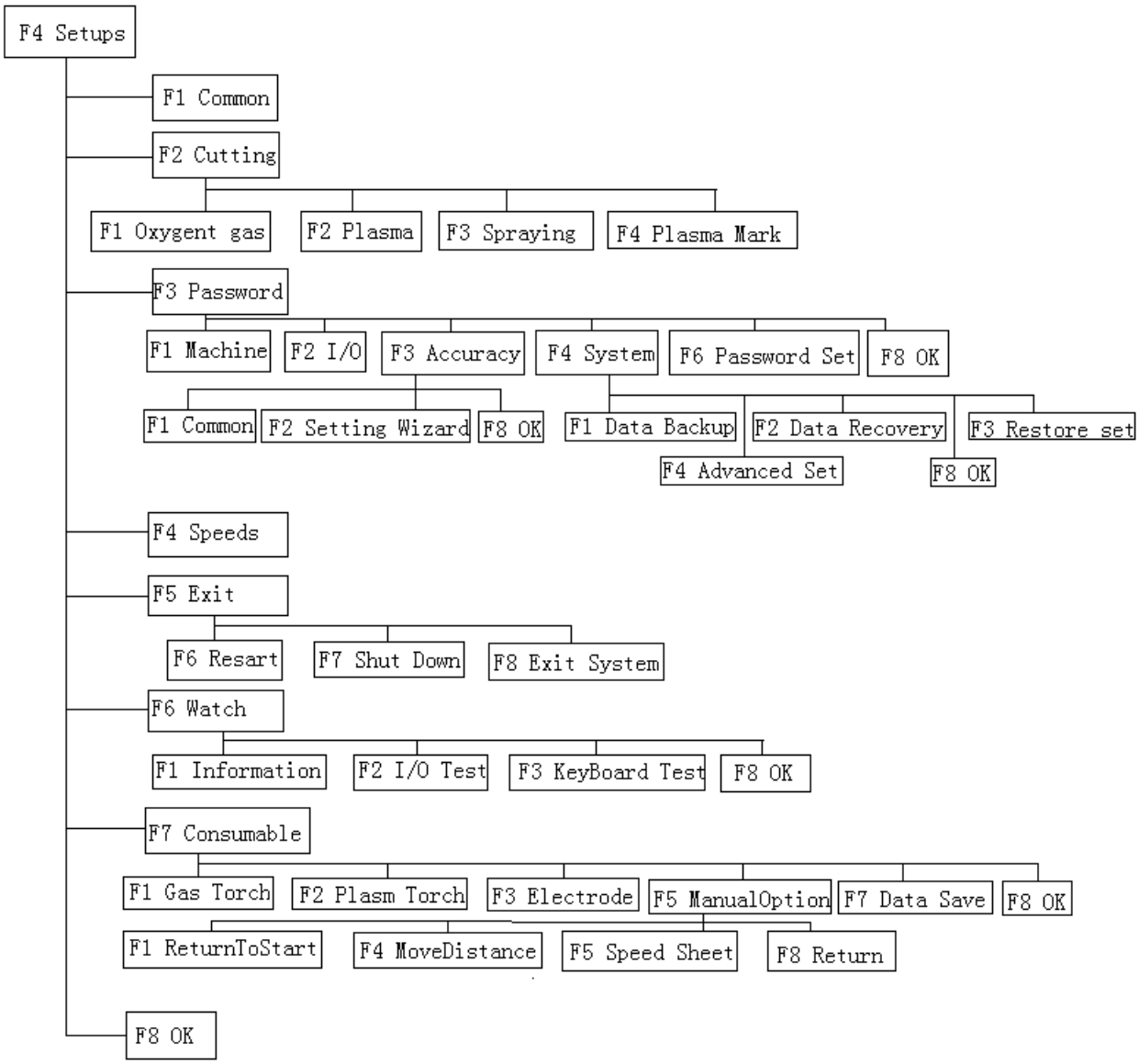


Figure 3.2.4.2 Structure and functions of system setups interface

3.2.4.1 F1 **Common**

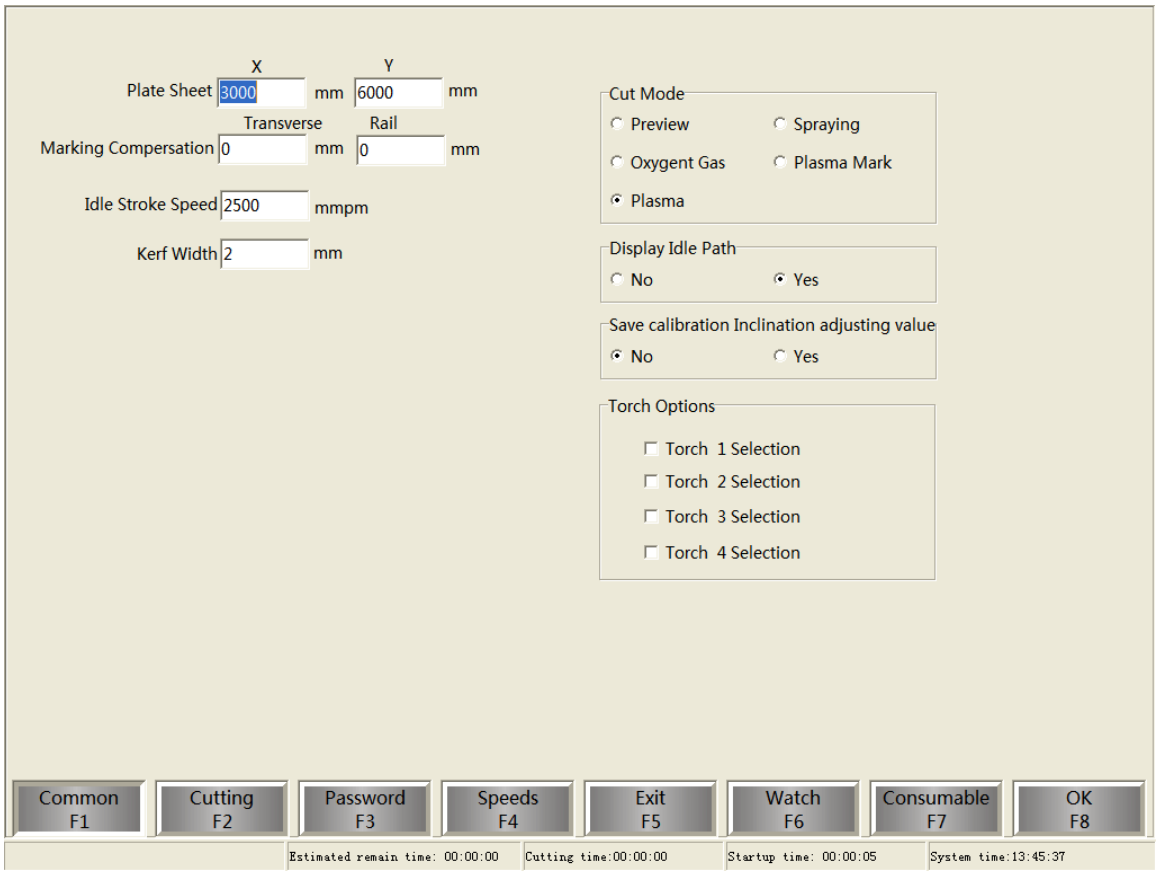


Figure 3.2.4.1.1 Common parameters

Plate size

Size of the plate to be processed, in order to inspect whether the plate is on the workbench.

Marking Compersation

The distance between sprayer and main cutting torch while powder spray marking.

Idle stroke speed

The speed during idle running, with the value greater than 0.

Kerf width

Width of kerf, with the value greater than 0.

Cutt mode

The system provides the following cutting modes: preview, oxygen gas, plasma, spraying and plasma mark. These options can be added or removed in encryption setting.

Note: all craftsmanship parameters are saved separately according to cutting mode to avoid mixing up. The current parameters are only under the current cutting mode but will not influence those under other cutting modes (expect system parameters).

Display idle path

Whether or not to display idle path of the Shape.

Save inclination adjusting value

Whether or not to save the value after calibration.

Select cut torch

To select cut torch used in cutting process.

3.2.4.2 F2 **Cutting**

The system currently supports oxygen gas cutting, plasma cutting, powder spray marking and plasma marking.

Oxygen gas

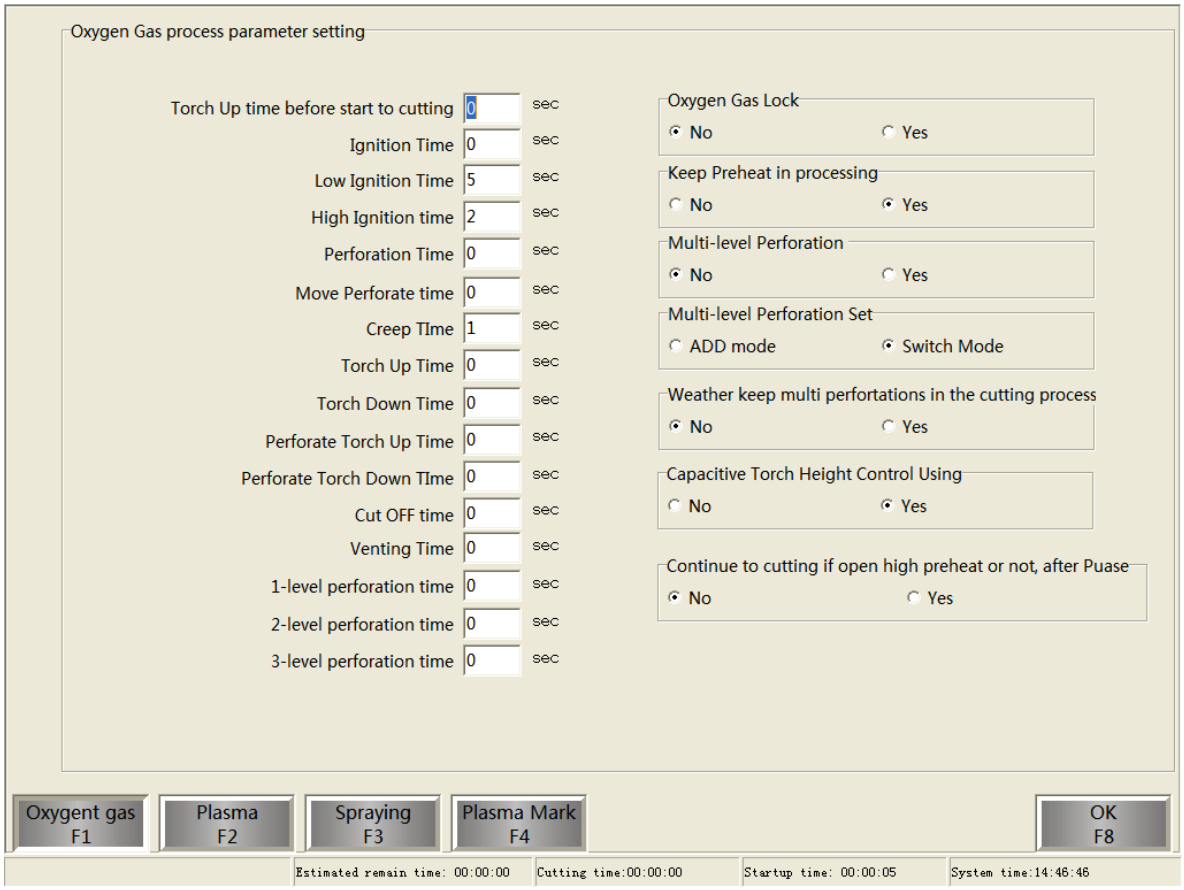


Figure 3.2.4.2.1 Oxygen gas cutting parameters

1. Torch up time before start cutting:The time torch up before start cutting.
2. Ignition time: The time during which the output signal remains valid for every ignition.
3. Low preheat time. For the equipment with low preheating function, the time during which the low preheating signal remains valid before high preheating. This time can be prolonged, cancelled or modified.
4. High preheat time. The time of the high preheating signal before every perforation. This time can be prolonged, cancelled or modified.
5. Perforation time. The time delay during the period after the cutting oxygen is opened up and the torch drops to the height for cutting. This time can be prolonged, cancelled or modified.
6. Move perforation time. The time for moving perforation after starting perforating.
7. Creep time. The time during which the equipment runs in creep speed after perforation. The creep speed can be set in speed parameter interface and is shown as the percentage of the cutting speed. After the creep time, the equipment will accelerate to the set cutting speed. During creeping, the cutting surface can be heated for a

better perforating performance. When multi-level perforation is adopted, this time is the average time of the multi-level perforation time.

8. Torch up time. The time during which the torch up signal remains valid after completion of each cutting.

9. Torch down time. The time during which the torch down signal remains valid before start of each cutting.

10. Perforate torch up time. The time during which the torch up signal remains valid in the perforation process.

11. Perforate torch down time. The time during which the torch down signal remains valid in the perforation process.

12. Cutting close time. The time during which the cutting control signal remains valid after completion of each cutting. It is generally set to zero.

13. Venting time. The time for the torch to pause and output discharging signal after completion of each cutting.

14. Level-1, Level-2 and Level-3 perforation time setting.

15. Lock gas. Whether to open the gas during preheat.

16. Keep preheat in cut process. Whether or not to enable preheating while cutting.

17. Multi-level perforation. Whether or not to adopt multi-level perforation. This function is usually adopted while cutting the thick plate and if there is low preheating device in the system. While cutting thin plates, ordinary perforation is enough; if no low preheating device is available, please don't adopt this function.

18. Multi-level perforation set. When multi-level perforation is adopted, the multi-level method should be adopted accordingly. The ascending means to increase one by one, and switching means to switch output of different levels.

19. Use Capacitive THC. Weather using capacitive THC

20. Continue to cutting if open high preheat or not, after Puase:When low preheat and high preheat are needed, continue to open high preheat after puase.

To set the parameters on the right, press F1 and then press Tab to switch among different parameters and move the cursor to the parameter you want to modify. After setting, save the modified parameter.

Plasma

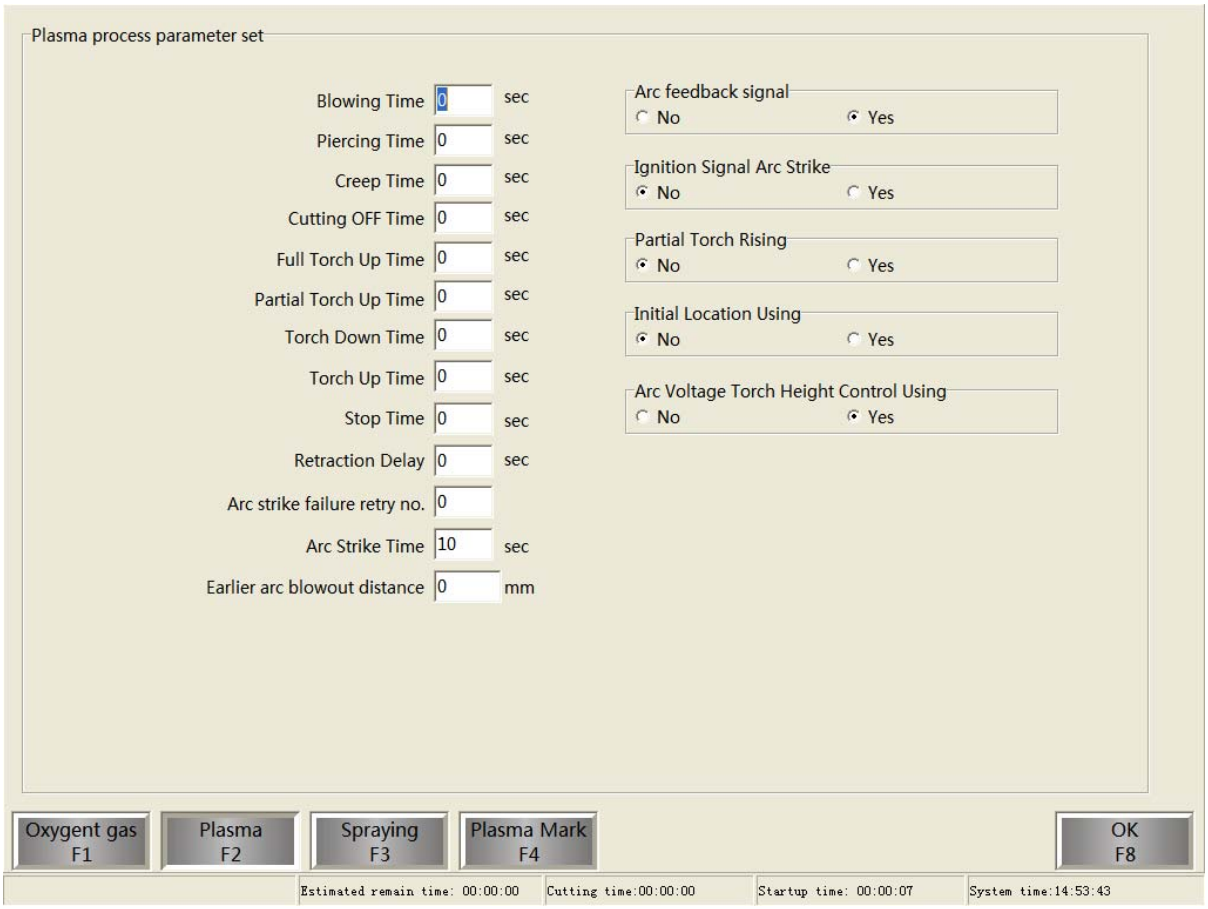


Figure 3.2.4.2.2 Plasma cutting parameters

1. Blowing time. The time for blowing before arc striking.

2. Perforation time. Time for perforation after completion of arc striking in order to ensure completion of perforation.

3. Creep time. The time during which the equipment runs in creeping speed after perforation. The creeping speed can be set in speed parameter interface and is shown as the percentage of the cutting speed. After the creeping time, the equipment will accelerate to the set cutting speed.

4. Cut OFF time. The time for delay in closing after completing of cutting. When cutting completes, delay in stop of cutting gas will maintain the cutting arc and enlarge width of cutting path, thus this parameter is used to compensate the delay in stop. It is generally set to zero.

5. Full Torch up time. The torch rising time when no adjuster is used and local rising is invalid.

6. Partial Torch up time. The torch rising time when no adjuster is used and local rising is valid.

7. Torch down time. The time for torch dropping. If auto height control system is applied, this parameter should be set to zero.

8. Torch up time. The time for torch rising. If auto height control system is applied, this parameter should be set to zero.

9. Stop time. The time delay before stop after blowout of arc.

10. Retract time. The time for retraction after stop.

11. Arc strike retry on fail The consecutive times of arc striking when arc striking feedback signal is valid.

12. Arc strike time. The time from generation of arc starting signal to completion of art striking.

13. Advanced arc OFF dist.: the distance of advancement when advanced arc blowout is required.

14. Use arc feedback signal. Whether or not the feedback is invalid after arc striking.

15. Ignition. Whether or not the ignition signal can be used as arc striking signal during arc striking.

16. Partial Raise. When no height adjuster is applied, whether or not the local rising is valid.

17. Initial position. When no height adjuster is applied, select whether or not to use this initial positioning function. If it is needed, then a positioning arriving signal is required.

18. Use arc voltage THC. Select Yes when an arc voltage torch height adjuster is connected.

To set the parameters on the right, press F2 and then press Tab to switch among different parameters and move the cursor to the parameter you want to modify. After setting, save the modified parameter.

Spraying

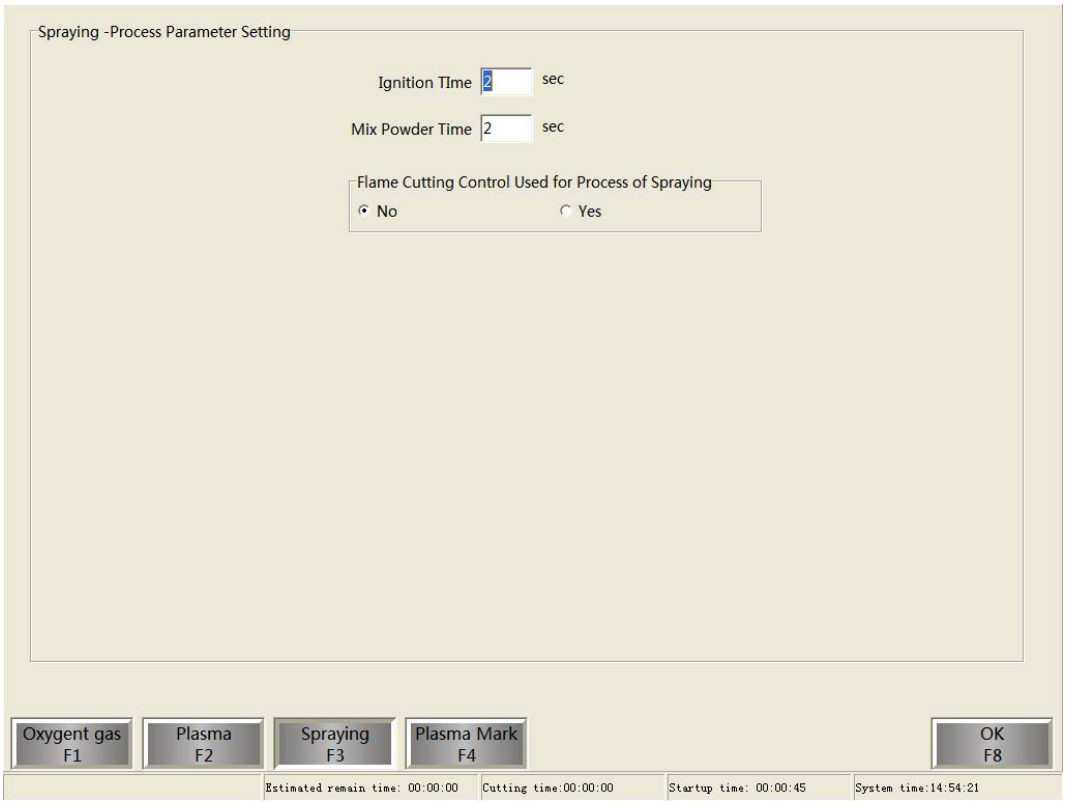


Figure 3.2.4.2.3 Power spray marking parameters

1. Ignition time. The ignition time delay before powder mixing when flame cutting control is not used in spray marking process.

2. Dust mix time: The time for mixing the powder after ignition when flame cutting control is not used in

spray marking process.

3. Use flame cutting control in spray marking process. If Yes is selected, the powder spray craftsmanship is the same with the oxygen gas ignition craftsmanship, otherwise only powder mixing and ignition craftsmanship will be applied.

To set the parameters on the right, press F3 and then press Tab to switch among different parameters and move the cursor to the parameter you want to modify. After setting, save the modified parameter.

Plasma mark

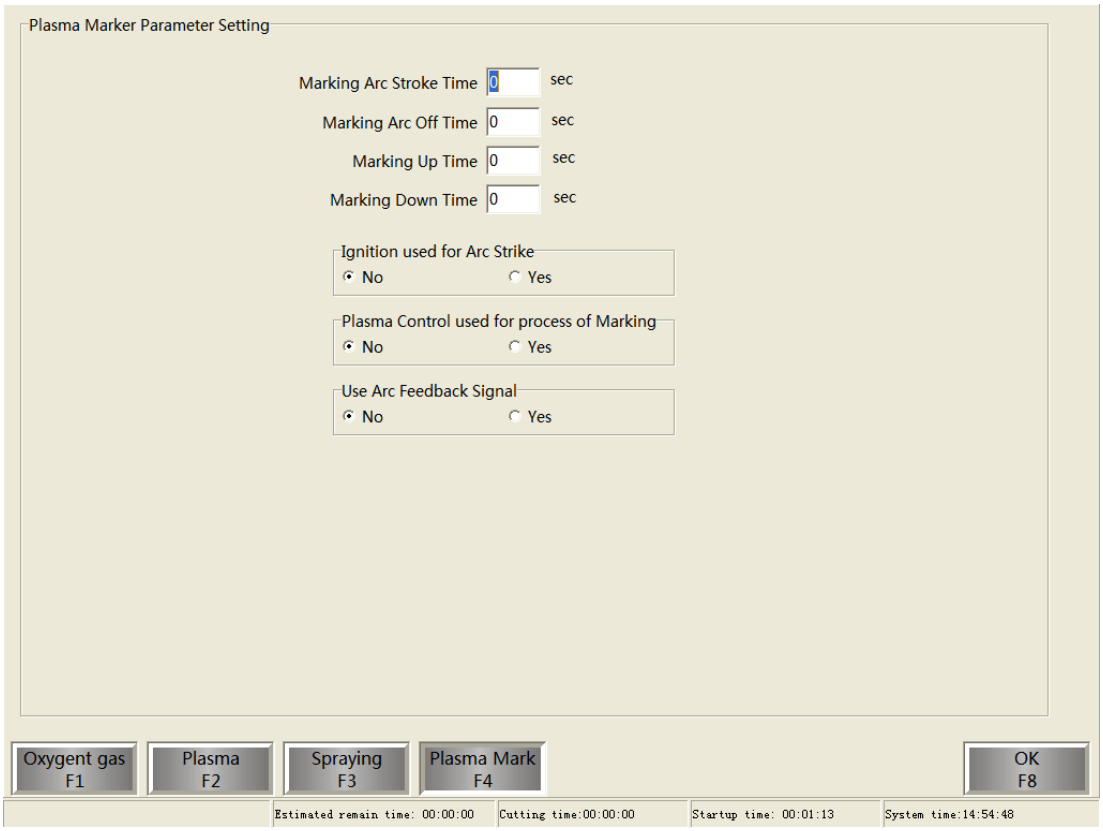


Figure 3.2.4.2.4 Plasma marking parameters

1. Mark arc strike time. The time delay for each marking arc striking.
2. Mar arc OFF time. The time delay for arc closing while arc blowout.
3. Mark up time. The time for marking rising after completion of marking.
4. Mark down time. The time for marking dropping after completion of marking.
5. Ignition for arc strike. Whether or not to use the ignition signal for arc striking while marking.
6. Plasma control for mark process. Whether or not to use plasma arc striking craftsmanship for marking arc striking craftsmanship.
7. Use arc feedback signal. Whether or not use the arc feedback signal while marking arc striking.

To set the parameters on the right, press F4 and then press Tab to switch among different parameters and

move the cursor to the parameter you want to modify. After setting, save the modified parameter.

3.2.4.3 F3 **Password**

Under System setting interface, press F3 and enter the correct password, then press Enter to enter the interface as shown in 3.2.4.3.1. Parameters in this interface are very important and should not be modified unless necessary.

Figure 3.2.4.3.1 Password set parameters

Machine

1. X Position: you can select Transverse axis or Rail axis according to your requirements.
2. Up arrow direction: you can define the axis according to your requirements, mainly depending on placement of the machine.
3. Right arrow direction: you can define the axis according to your requirements. If X axis is defined for up arrow, then only Y axis can be defined for right arrow.
4. Servo enable: select Yes if you need the software to enable the servo, otherwise select No.
5. Zeroing direction: Define according setting of the zero point.
6. Pulse output method: you can select double pulse or pulse + direction.
7. X axis drive direction: you can select forward or backward according to your requirement.

8. Y axis drive direction: you can select forward or backward according to your requirement.

9. Limit and alarm: select Yes if you need to use limit and alarm, otherwise select No.

I/O

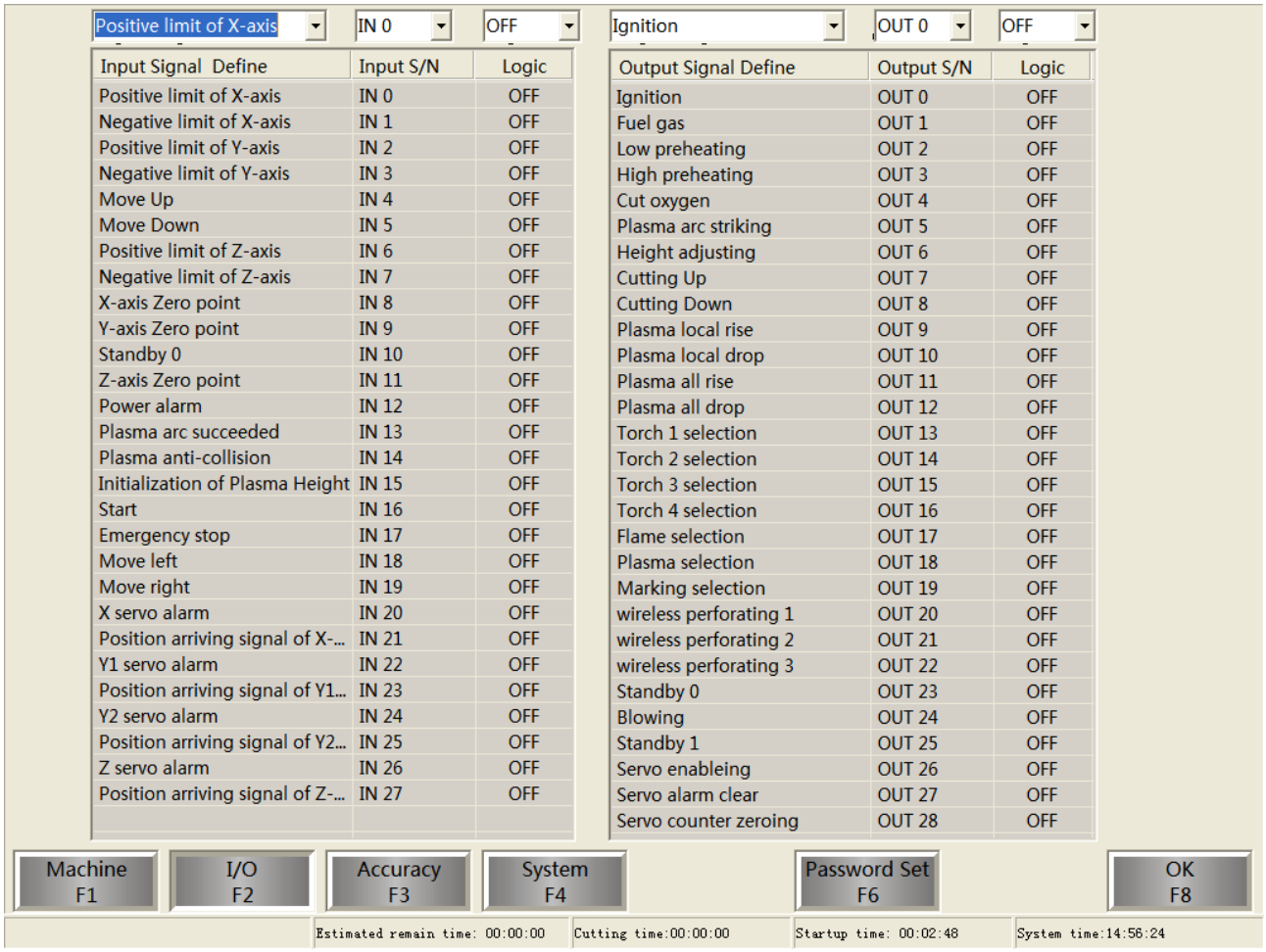


Figure 3.2.4.3.2 I/O Configuration

The I/O configuration allows you to customize the input and output ports of the system, and they must be matching with the external interfaces of the cutter. The serial No. here is not line No. (i.e. socket No.) but IN and OUT No. Refer to definition of the ports for the relationships between line No. and OUT/IN No. Currently the system supports 28 input ports and 29 output ports. The system will prompt at the bottom right of the interface if port setting exceeds the limit. After modification, press F8 to save the setting and apply the modified ports. This function is provided to convenience future maintenance. If one of the ports is not functioning, you can simply change the port without having to return the entire machine for repairing.

Note: do not modify the port if it functions well in order not to disorder the cutting machine if you don't understand the cutting machine very well. Of course, if you know it very well, you can customize the port according to your requirements.

Accuracy

Basic accuracy parameters:

1. Pulse equivalent: pulse equivalent is a link for the communication between the system and the outside world. This value should be calculated for many times to ensure its accuracy. Details of setting of the pulse offset are introduced below.

2. Inverse gap compensation value: the inverse gap compensation of X axis and Y axis.

3. Working area size: size of the workbench so that the system will prompt whether the plate or Shape exceeds the allowed size of the workbench.

Accuracy setting guide: set the pulse offset through a guide.

Example of pulse equivalent setting:

1) Under the Accuracy setting interface, press F2 to enter Accuracy setting guide interface as shown in the figure below.

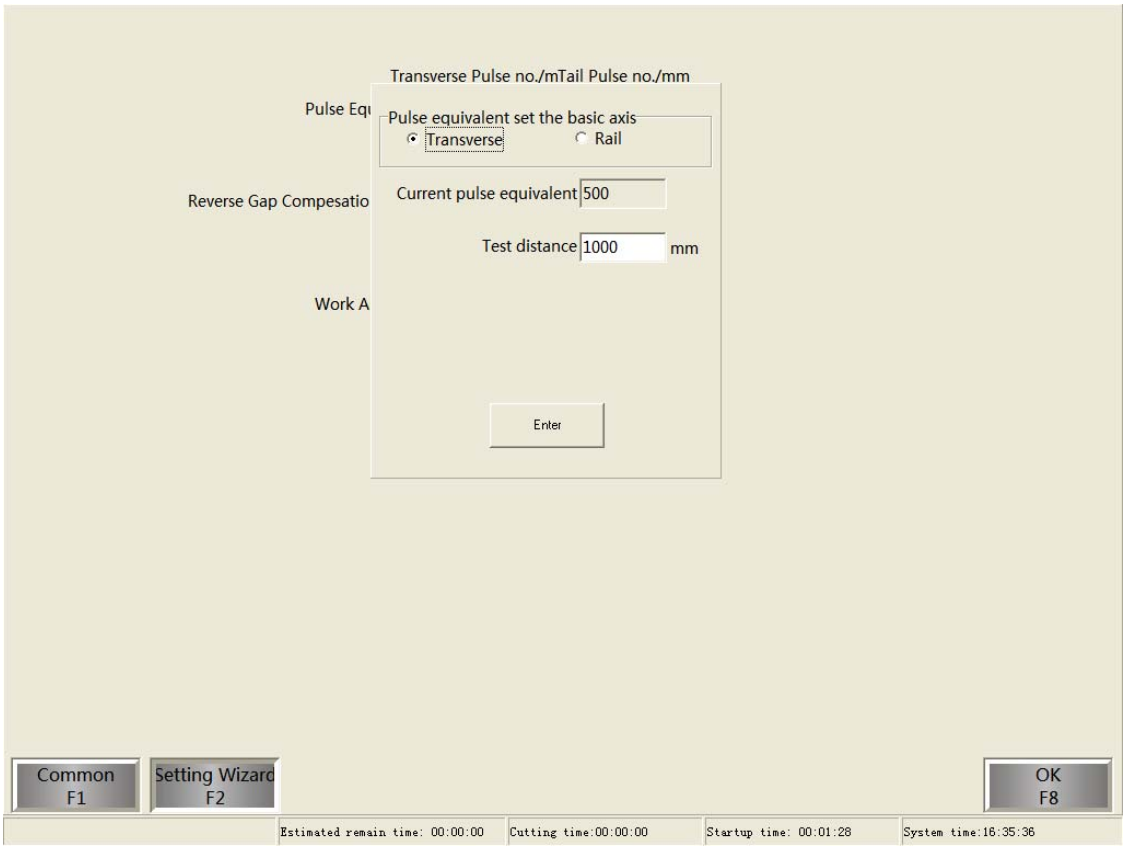


Figure 3.2.4.3.3 Accuracy setting guide interface

2) In the Base axis of pulse offset setting option, select the axis you want to set pulse offset. The Current pulse offset displays the current offset vale. Then enter the distance to move to the specified direction in the test in Test distance. In this example, we select Transverse axis and enter a test distance of 1000mm. Finally press Enter, the test process as shown in Figure 3.2.4.3.4 will appear.

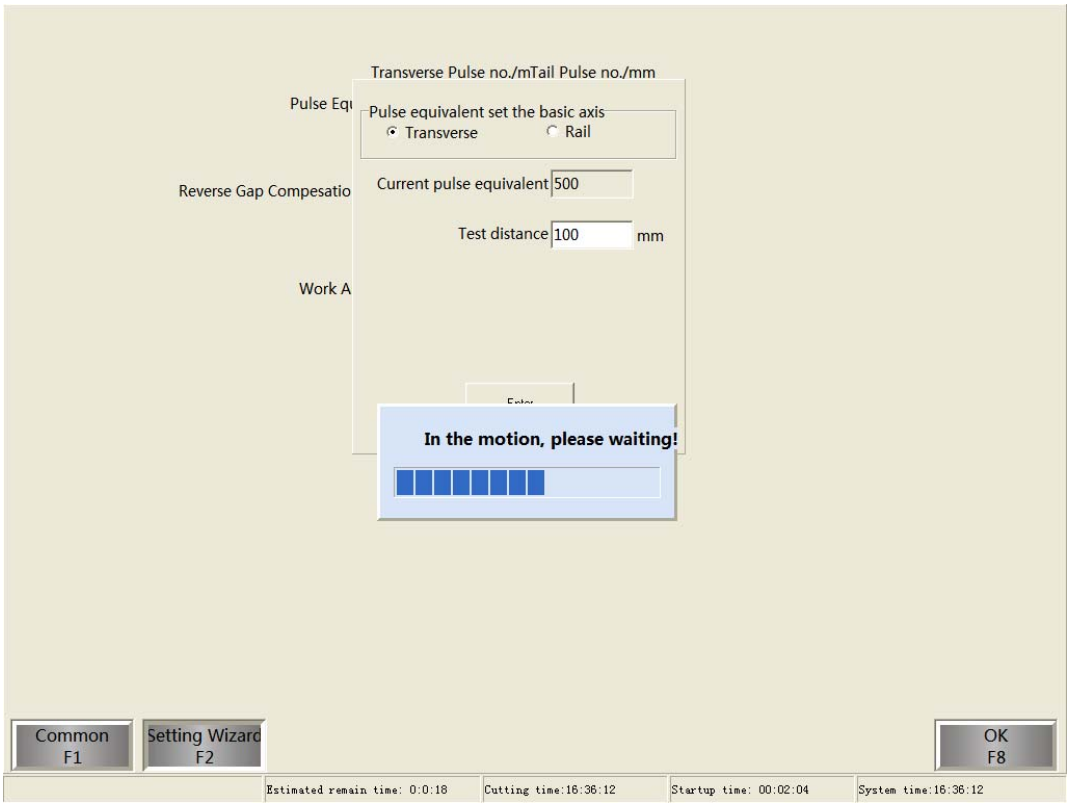


Figure 3.2.4.3.4 Accuracy setting test process

When the selected axis is tested and moved, the following interface will appear as shown in the figure 3.2.4.3.5.

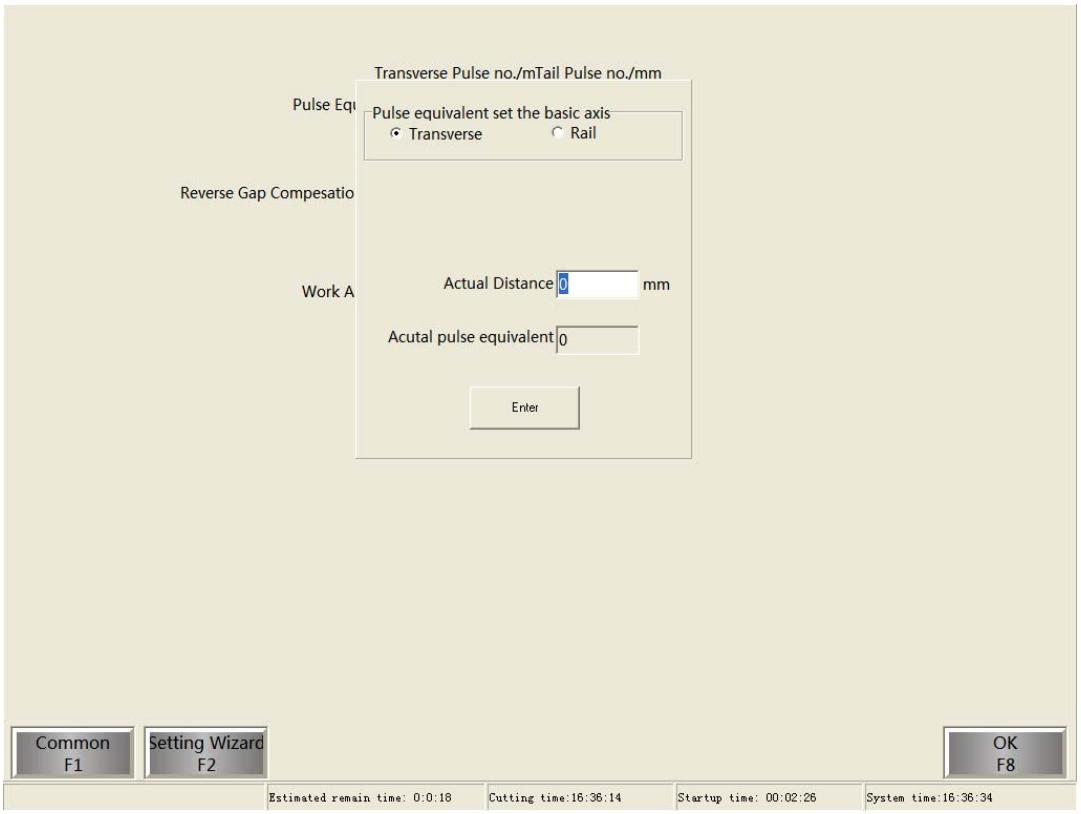


Figure 3.2.4.3.5 Accuracy setting test completed

3) Use the measuring tool to measure the actual moving distance at the direction of the selected axis, and enter this value into the Actual distance as shown in Figure 3.2.4.3.5, then press Enter, the actual pulse offset will display in Actual pulse offset, as shown in Figure 3.2.4.3.6.

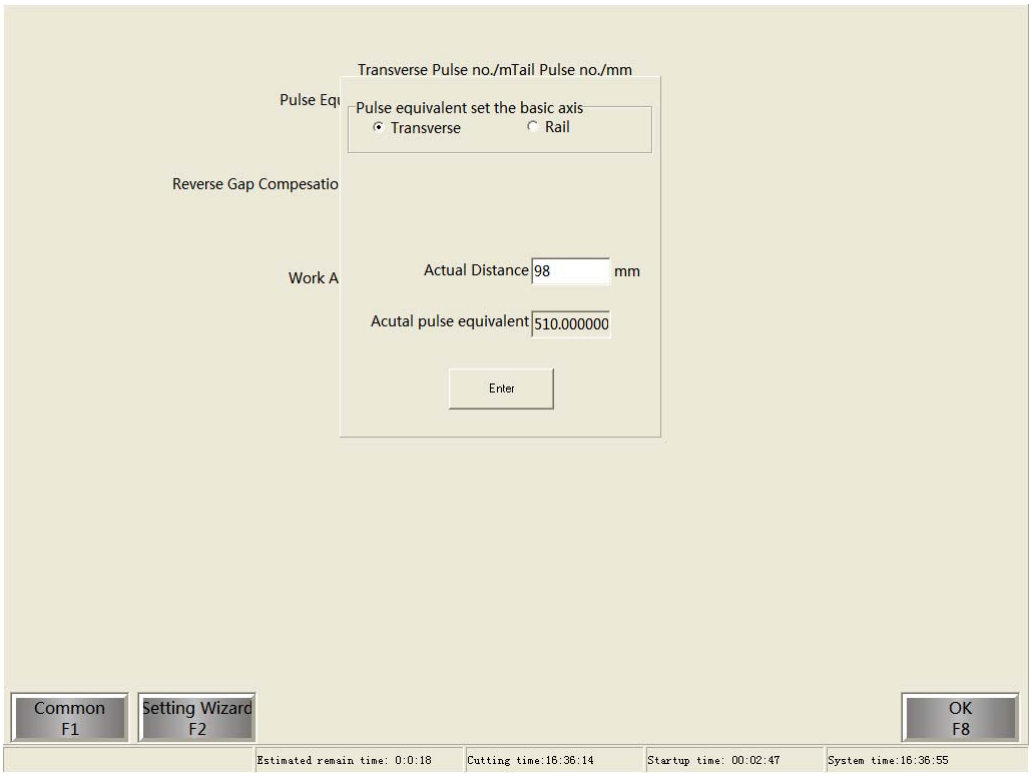


Figure 3.2.4.3.6 Accuracy setting completed

4) Press Enter, system will save the pulse offset and the accuracy guide is completed. Users may repeat the above steps to set pulse offset for different axis or the same axis.

Note: normally, slight difference may occur in the pulse offsets of the X axis and Y axis in the same equipment, so you need to set them respectively in the adjustment (it is recommended to adjust them to be the same with each other).

System

Other settings for the control of the system are shown in the figure below:

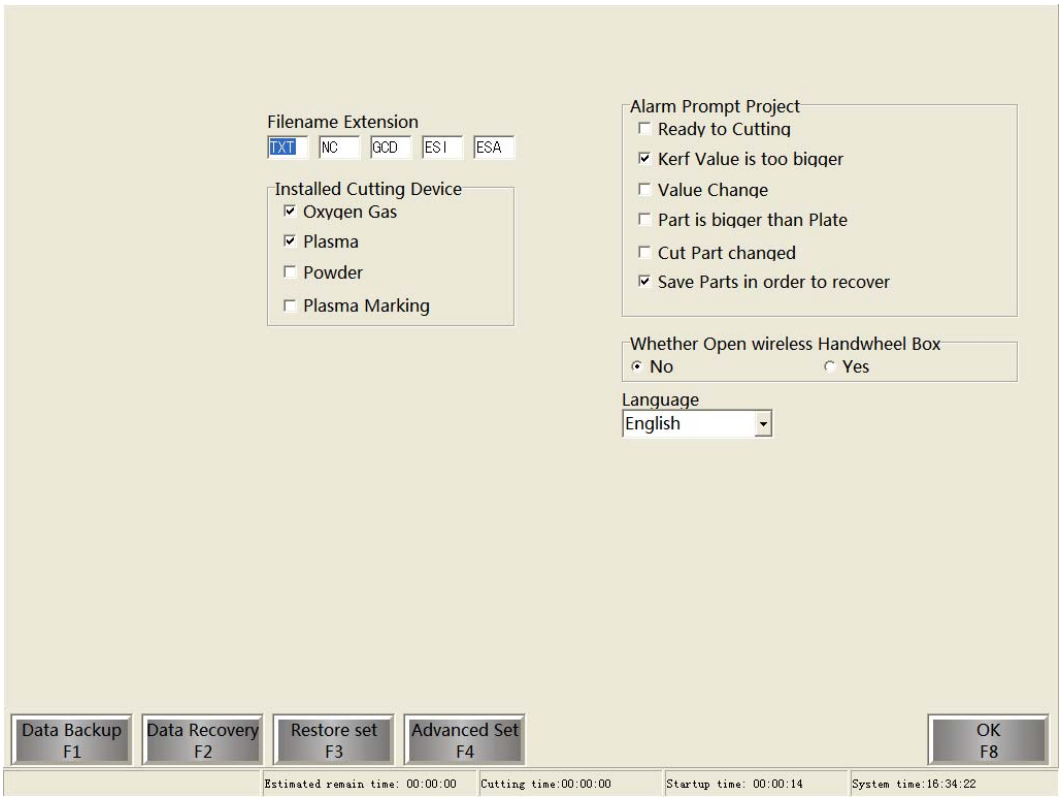


Figure 3.2.4.3.7 System setting

1. Filename extension. The system supports TXT, NC, GCD, ESI and ESA files, mainly are G code and ESI code files.

2. Cut equipment installed. The system provides four kinds of cutting craftsmanship including oxygen gas, plasma, powder spray marking and plasma marking. You can select the craftsmanship according to what craftsmanship is installed in your equipment.

3. Alarm prompt options. The alarm prompt options provides the following prompts including Ready to cut, Slotting too large, Value modified, Component larger than plate, Component modified, and Save component for recovery. Users can select the prompts according to their actual needs.

4. Whether Open wireless Handwheel Box:if select "Yes",you can use the wireless Handwheel Box.

The system setting interface also provides data backup and recovery functions:

1. Press F1 to backup the setting value in the current interface.

2. Press F2 to restore the setting value in the current interface to the previous backup.

3. Restore default setting.

Press F8 to save the data after modification.

Password set

Password modifying setting, see Figure 3.2.4.3.8 for the interface.

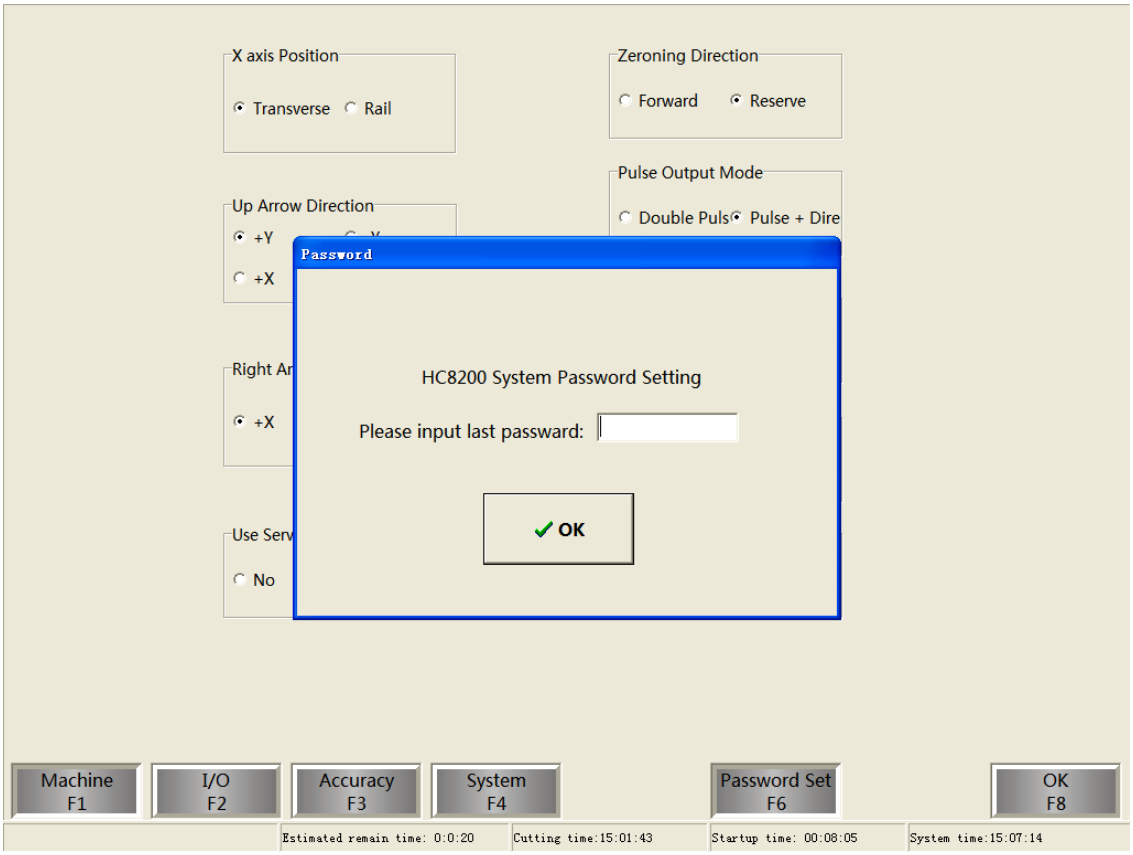


Figure 3.2.4.3.8 Password setting

Enter the password and press Enter;

Enter the new password and press Enter to confirm.

After setting, press F8 to save the data.

3.2.4.4 F4 **Speeds**

Under system setting interface, press F4 speed parameter key to enter the interface as shown in Figure 3.2.4.1.

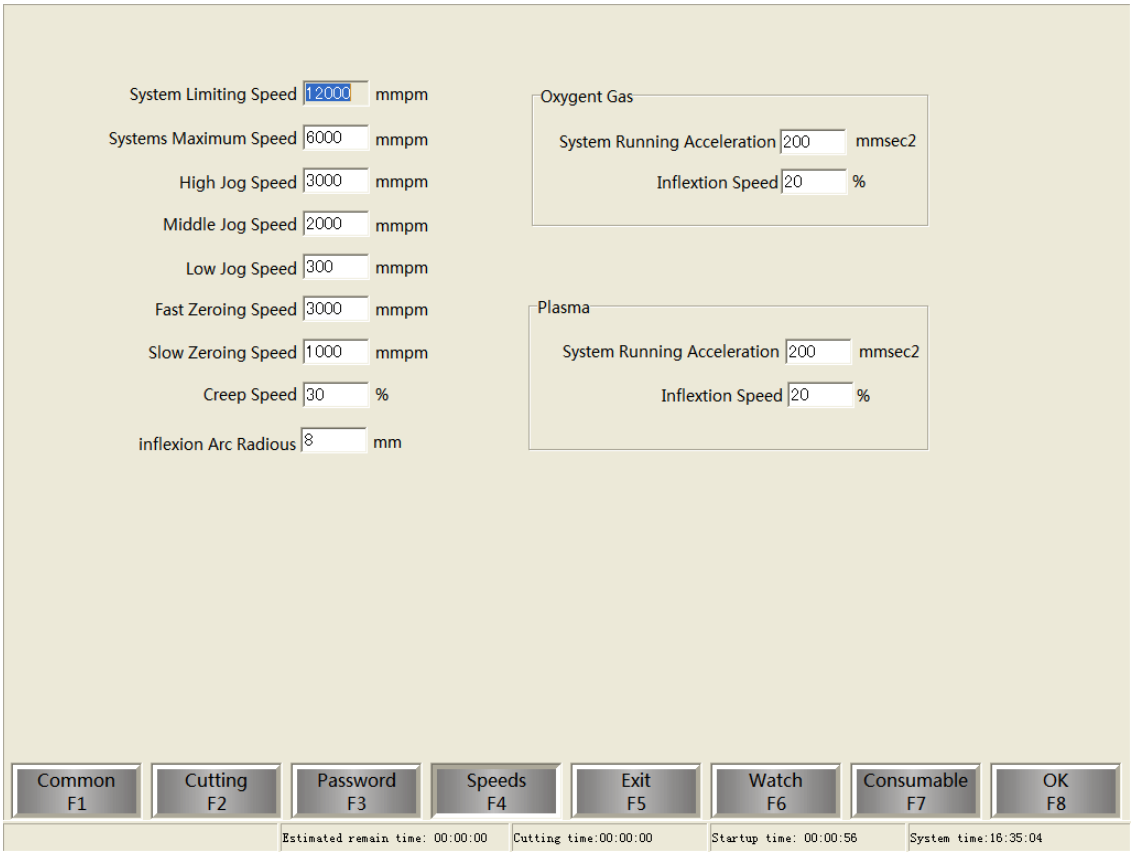


Figure 3.2.4.4.1 Speed parameter

1. System limited speed: the speed limit the machine can reach. The speed limit of this system is 12000mmpm, and it cannot be modified.
2. System max. speed: the max. speed that machine can reach while processing. The actual speed is the product of the max. speed and the speed percentage.
3. High jog speed: high speed according to speed level.
4. Middle jog speed: middle speed according to speed level.
5. Low jog speed: low speed according to speed level.
6. Startup/corner speed: the corner speed during cutting.
7. Fast/Slow home Speed: when home, the machine moves at high home speed at first, and decelerates and stops when hitting the switch, and then moves back at low home speed until signal disappears.
8. Creep speed: the machine tools needs to move forward slowly during perforation, which is called creeping. The creeping speed is set with this parameter and is shown as speed percentage.
9. On the right of the Speed parameter interface you can set the acceleration of the machine and the speed of the corners within different cut mode.

Note: during auto cutting, the system only allows a processing speed lower than original speed; during manual cutting, when the moving speed is lower than original speed, the system will run at original speed.

3.2.4.5 F5 **Exit**

Press F7 under the main interface to enter Exit interface as shown below:

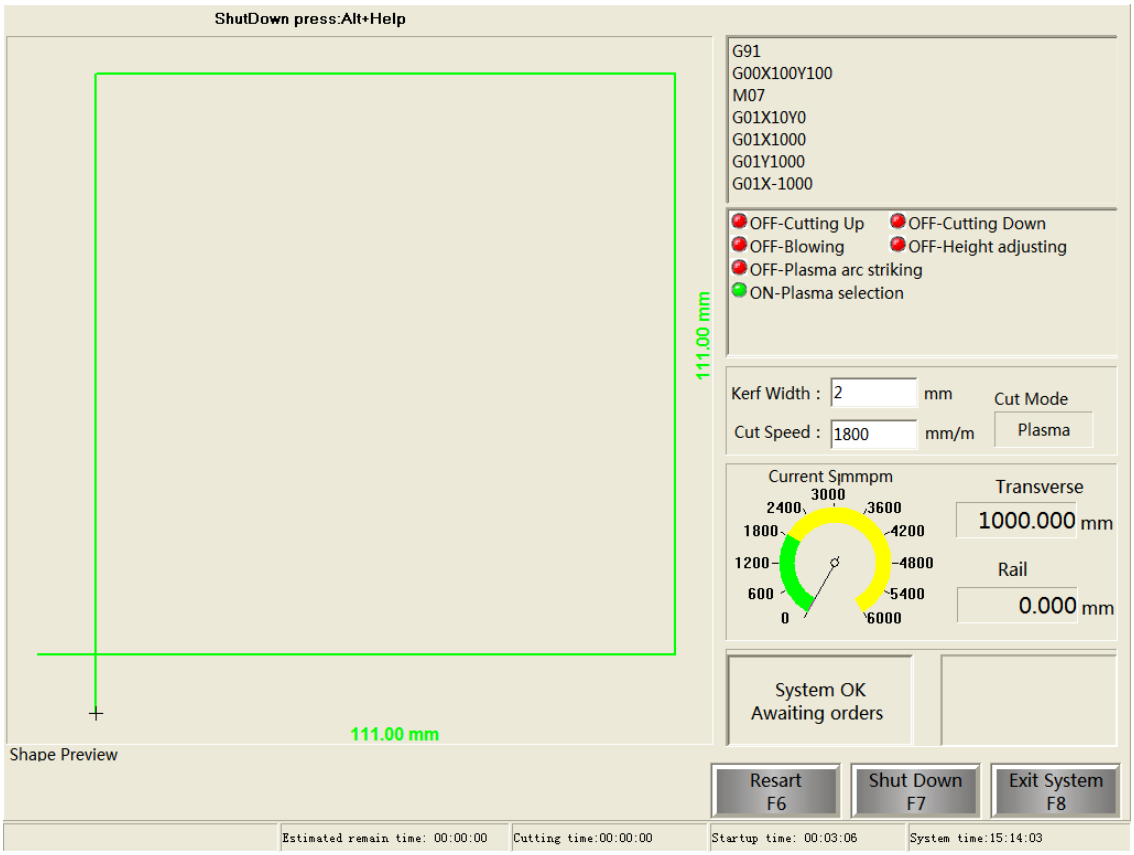


Figure 3.2.4.5.1 Exit interface

Restart

Restart the PC

Shut down

Shut down the PC

Exit System

Exit cutting system

3.2.4.6 3.2.4.6 F6 Watch

Under System setting interface, press F6 to enter Port diagnosis interface:

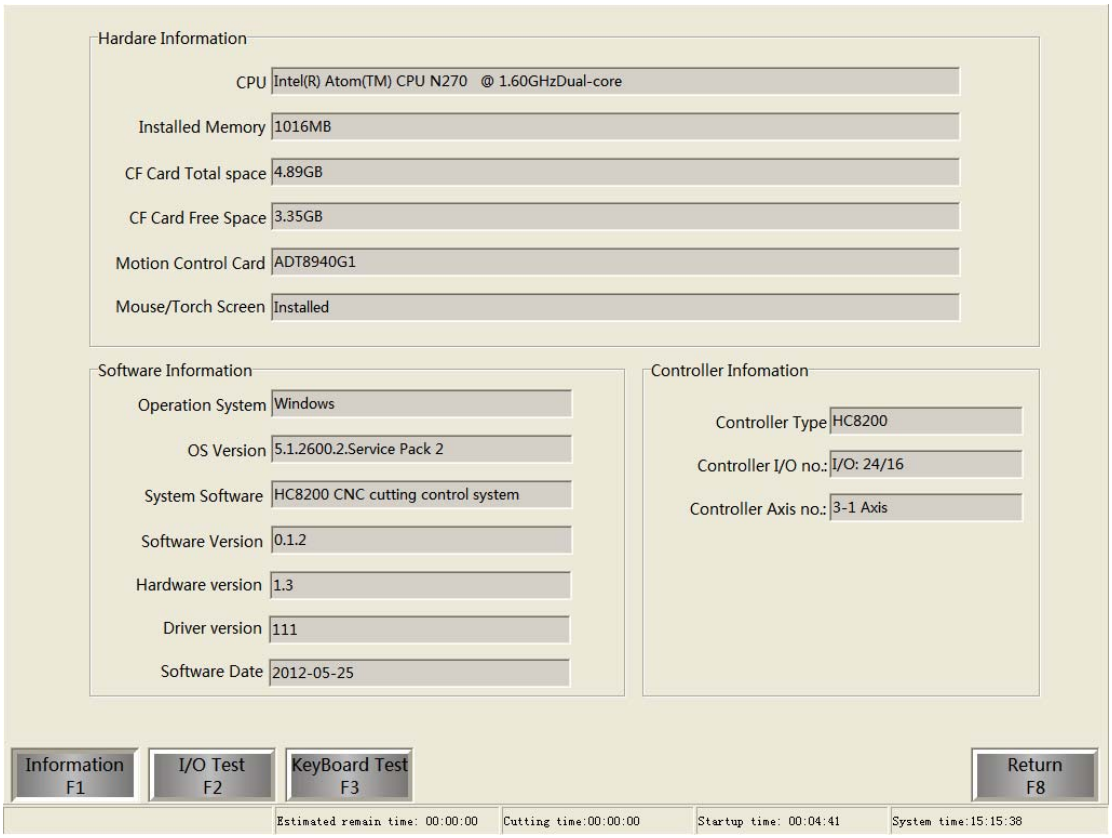


Figure 3.2.4.6.1 System diagnosis interface

Information

It displays the hardware information, software information, controller information, etc., of the controller.

I/O test

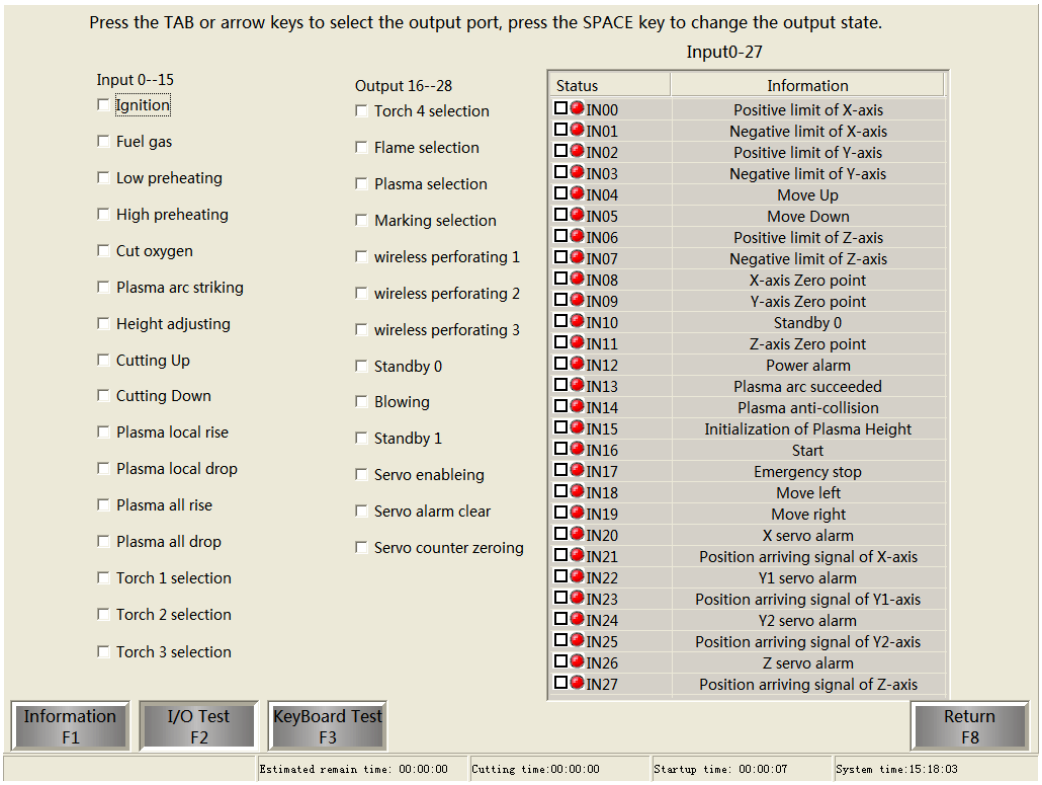


Figure 3.2.4.6.2 Input/output test

Test input port, red light means open, and green light means closed; the system will prompt name of the port at the same time; the output port is closed if it is not selected, and is open if selected; the system will prompt the name of the port, as shown in Figure 3.2.4.5.2.

Press F2 to enter Output port diagnosis interface to test output functions, in which red light means open, yellow light means selected, and green light means closed. The system will prompt the name of the port when a port is selected (corresponding to I/O setting above).

Keyboard Test

Press F3 to enter Keyboard testing interface, as shown in the figure below:

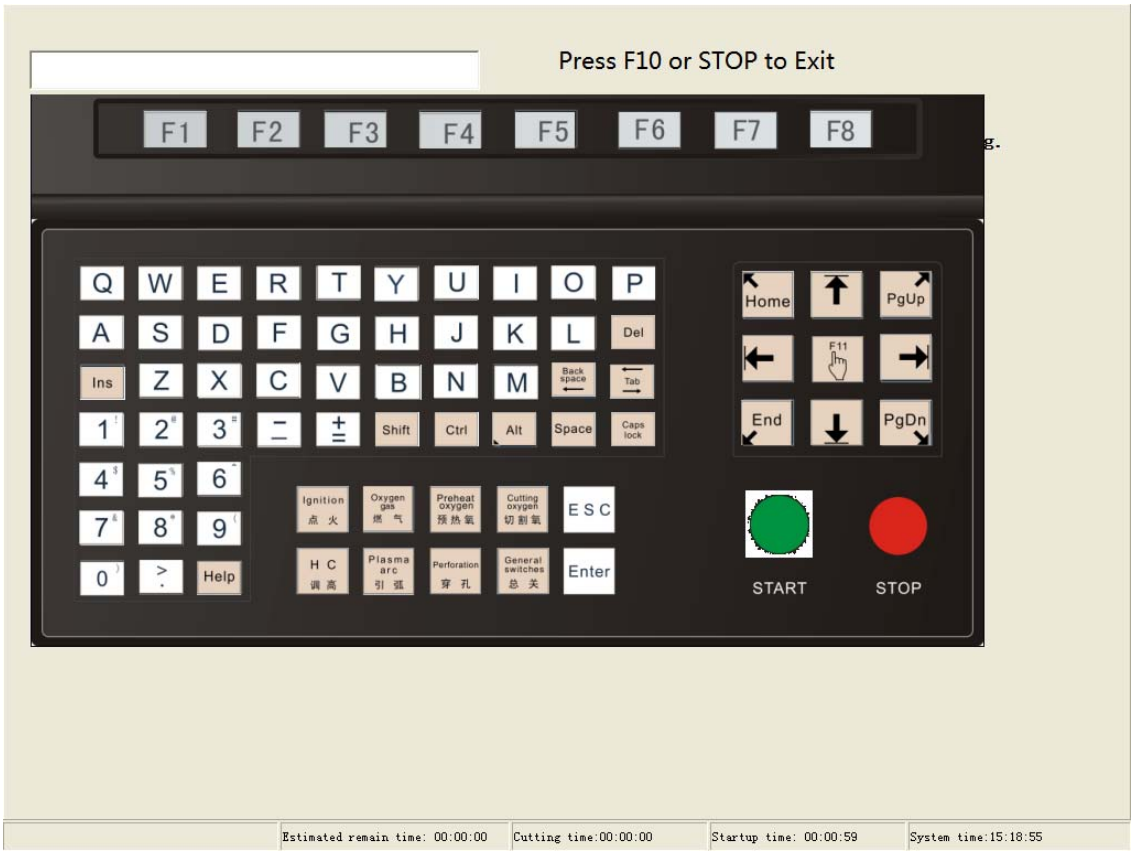


Figure 3.2.4.6.3 Keyboard test

Once you press a key, it will be displayed in this interface and the corresponding key in the interface will become red; when you release that key, the corresponding key in the interface will become light green. If no response in the interface when you press a key, it means this key is not functioning. Press F10 or STOP to exit keyboard testing.

Basic operation of system diagnosis:

The system diagnosis displays the open hardware resources in the system. In System diagnosis screen, you can check the following interfaces:

1) Output detection: press ← ↑ → ↓ keys to move the cursor any position of the optical isolation output.

You can press Space to change output level status. Refer to hardware input/output port (Definition of output ports) for the signs and definitions of each output port.

2) Input detection: display the status of the current optical isolation input. Green "  " means input signal is detected at the current position, and red "  " means this port has no setting. For example: if input signal is detected at "Port 00", then the red lights after it will become green. Refer to hardware input/output port (Definition of output ports) for the signs and definitions of each import port.

3) Keyboard detection: press any key in the keyboard at the corresponding position and the pressed key will be displayed on the screen. If no response on the screen even after a key is pressed for many times, or the position is not correct, it means the system is not functioning well.

3.2.4.7 F7 **Consumable**

。This interface is used to track and record the useful life of the spare parts. If you press the new nozzle or new electrode key every time after replacing the nozzle or electrode, then the information of the previous nozzle or electrode will be updated. This function allows you to view the time of replacement of the wearing parts and calculate the useful life based on minute or perforation times. The wearing parts replacement prompt may be adopted and in such case, when a wearing part reaches the use time limit, the system will prompt.

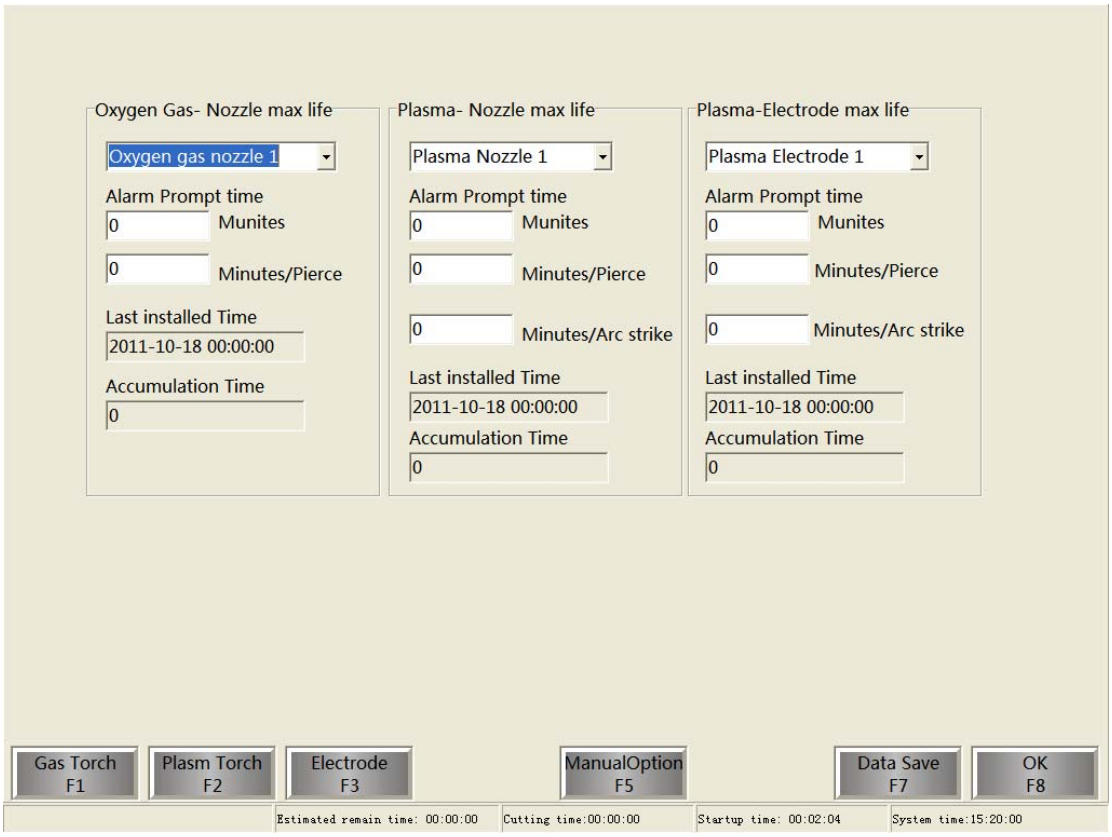


Figure 3.2.4.6.4 Replace spare parts

Gas Torch

Record installing time of new oxygen gas cutting nozzle.

Plasma Torch

Record installing time of new plasma cutting nozzle.

Electrode

Record installing time of new plasma electrode.

Manual options

Move the nozzle and electrode manually.

Data Save

Save the current data.

Alarm prompt time

If displayed nozzle or electrode last to the alarm prompt time, the alarm will start.

Min/pierces

Generally speaking, perforation may reduce the useful life of the wearing parts. This parameter allows the user to input the time required for each perforation, and calculate this time into the useful life of the wearing parts, in order to accurate the time statistics.

Last installed

Display last installing time of the nozzle or electrode.

Accumulated

Display the accumulated use time of the nozzle or electrode.

3.2.5 F5 View sheet

Press F5 under the main interface to View sheet. This function allows switching between part interface and plate interface, as shown in the figures below:

Figure 3.2.5.1 Plate interface

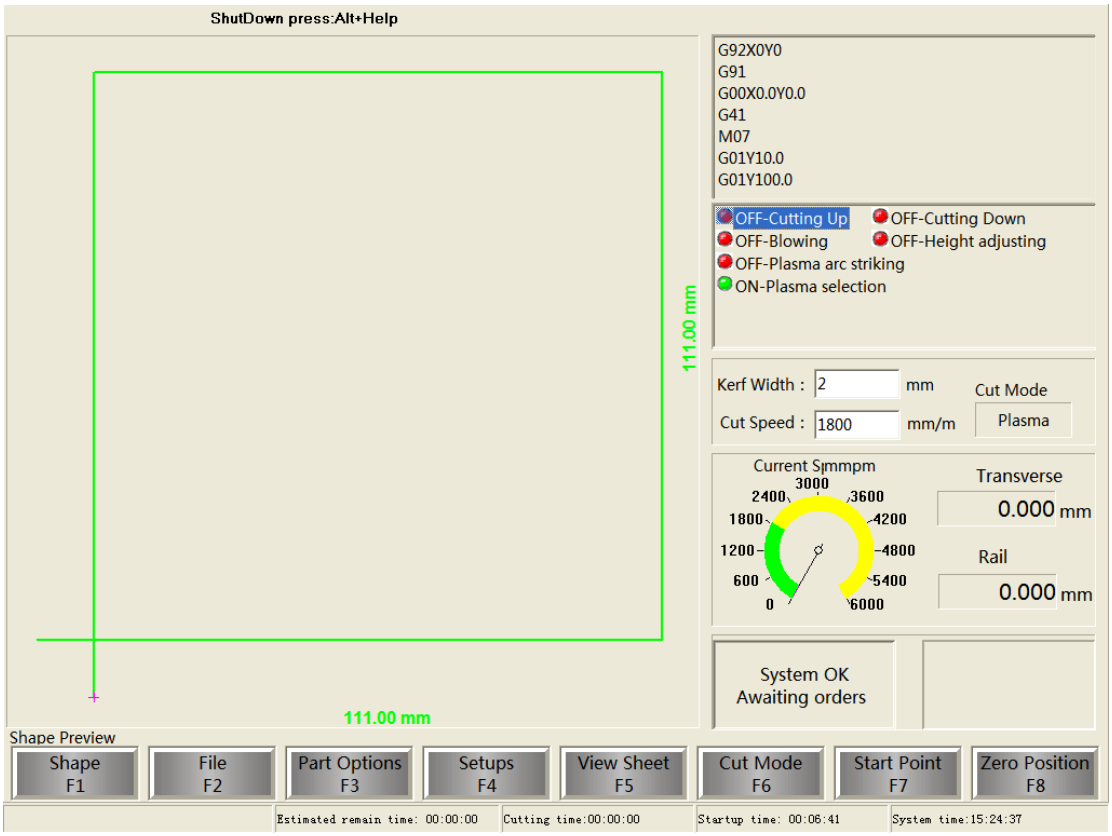


Figure 3.2.5.2 Parts interface

3.2.6 F6 Cut mode

Press F6 under the main interface to switch among different cut modes until the one you require. Now the system supports preview, oxygen gas, plasma, powder spray marking and plasma marking. As shown in figure 3.2.6.1, the cutting mode is displayed in the red circle marked in the interface.

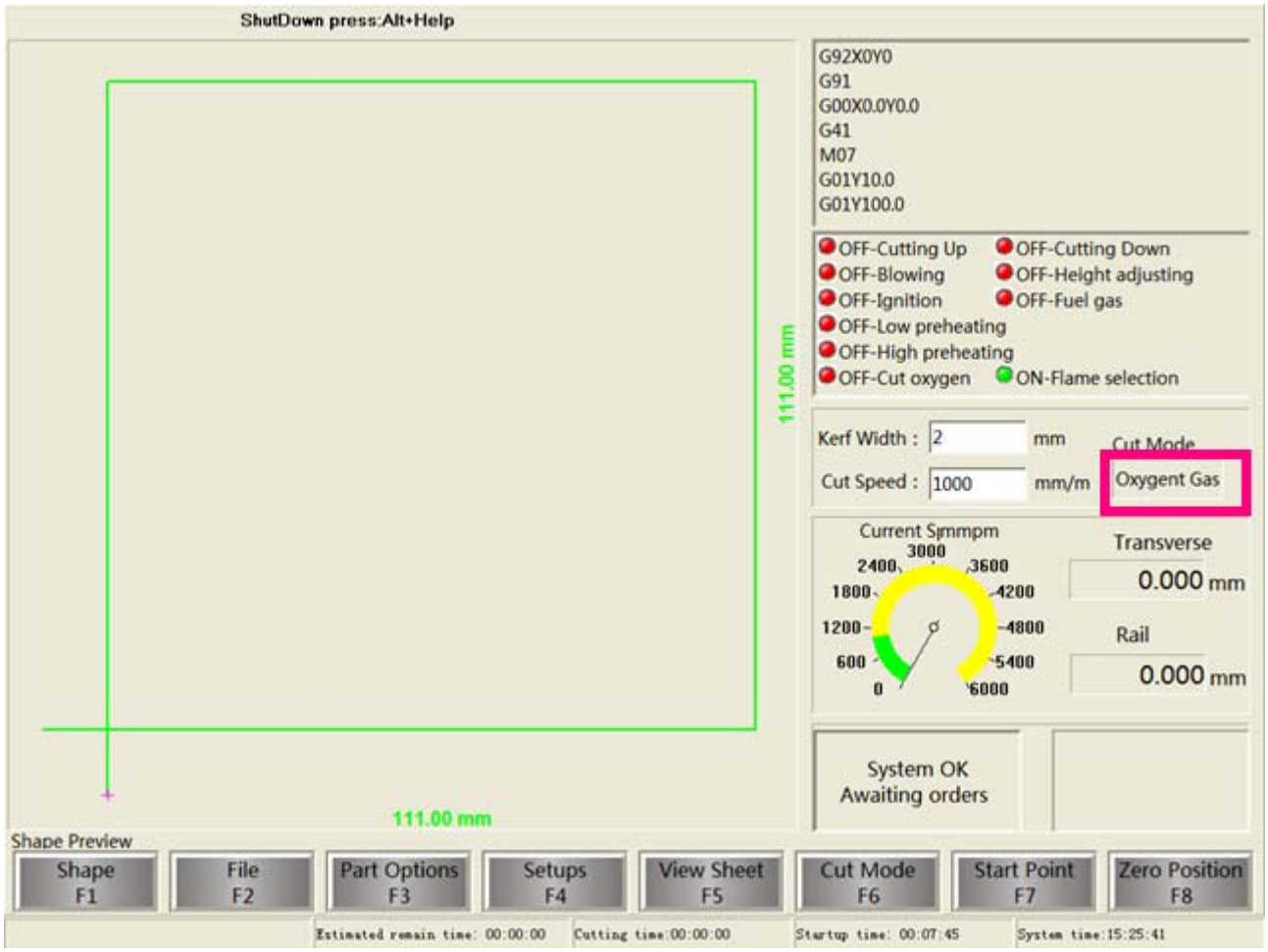


Figure 3.2.6.1 Oxygen gas cut mode

Press F6 under this interface, the cutting mode switches to Oxygen gas from Preview, and the IO monitoring will change accordingly, as shown in Figure 3.2.6.1.

Figure 3.2.6.2 Plasma cut mode

3.2.7 F7 Starting point of cutting

Press F7 under the main interface to switch the start point of the Shape to be cut, as shown in the figure:

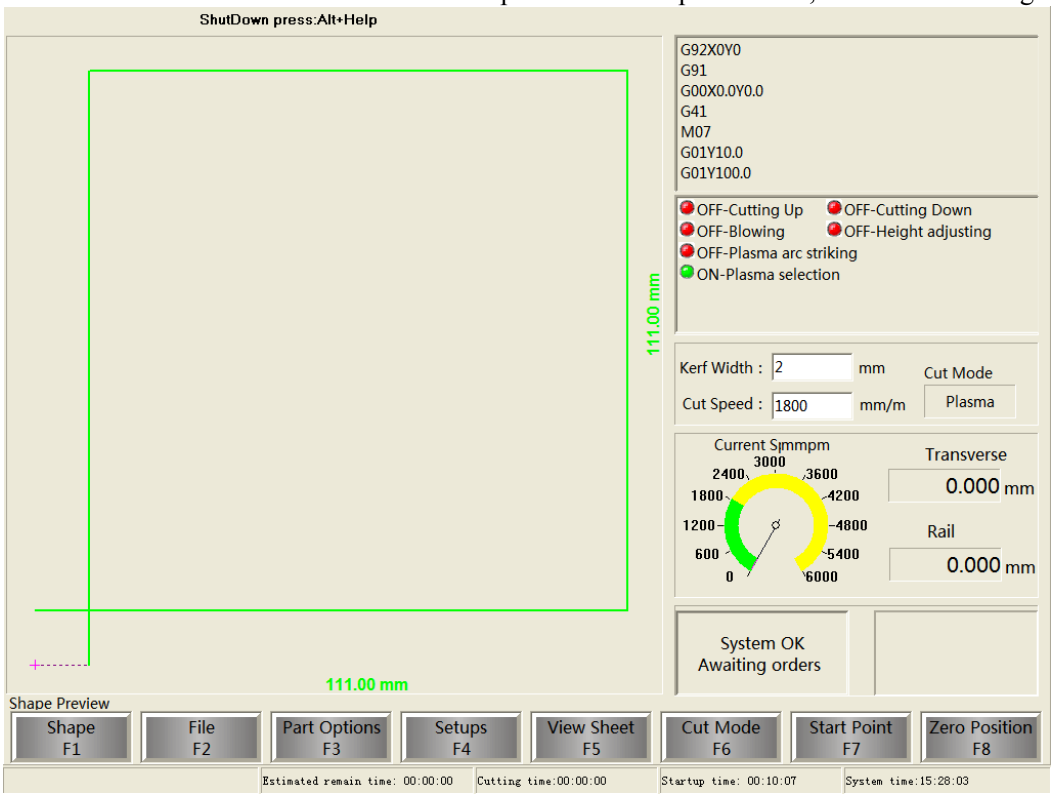


Figure 3.2.7.1 Switch start point

The start point is switched to the bottom left corner.

3.2.8 F8 Zero Position

Press F8 under the main interface for position zeroing. This operation will clear the distance data of all axes and set them to 0.

3.3 Auto processing description

To modify parameters under the main interface, press Tab to switch to the parameter you want to modify, and press Enter to confirm after modification.

Note: the speed parameter here are calculated by the system according to a certain law based your setting, and the system will check whether your setting is reasonable. If the speed parameter you set is not able to satisfy the requirements of the system, then the system will make adjustment according to your setting, as a result the actual parameter may be different from the parameter you set. The speed can only be modified when the process is paused.

After setting parameter, press START and the system starts auto processing, as shown in the figure below:

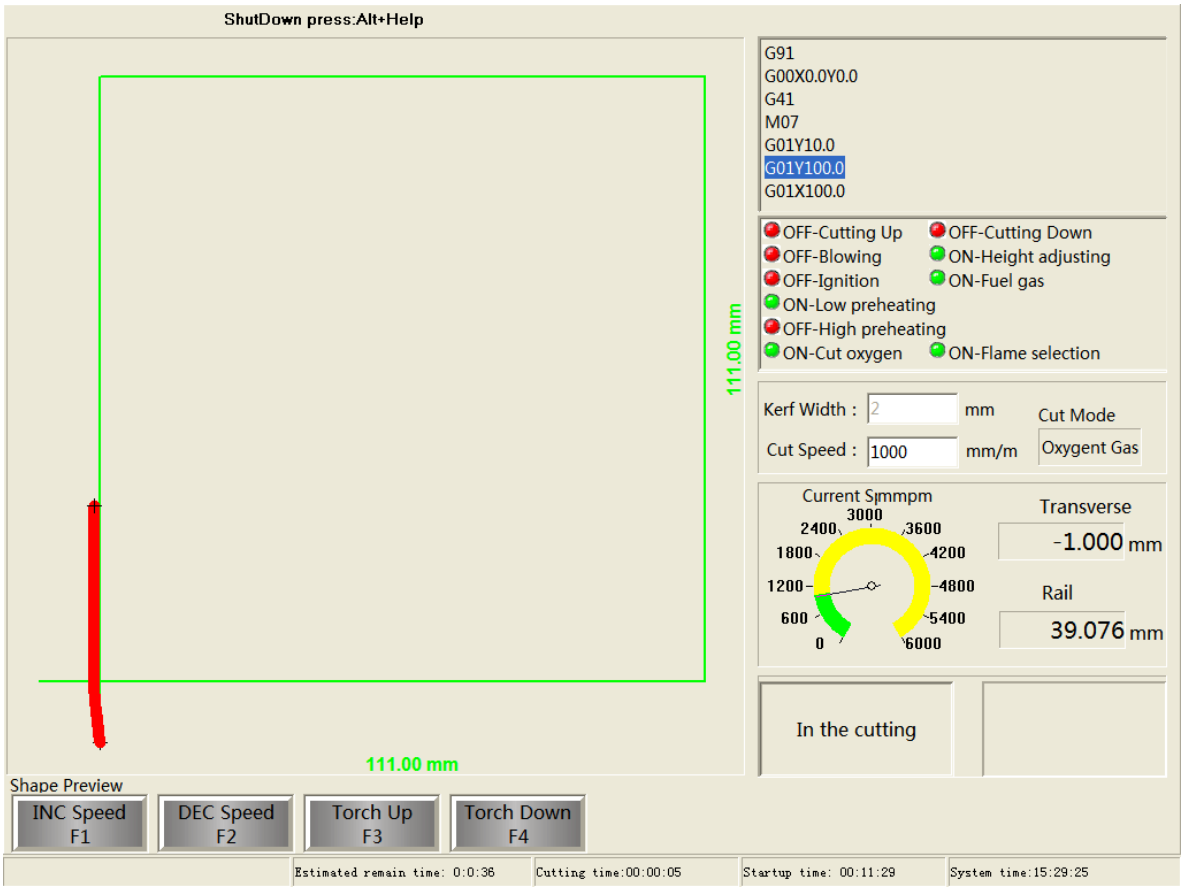


Figure 3.3.1 Auto processing interface

The processing mode includes preview, oxygen gas, plasma, powder spray marking and plasma marking.

3.3.1 Pause

If you need to pause the cutting process, press STOP and the process will be paused, as shown in the figure below:

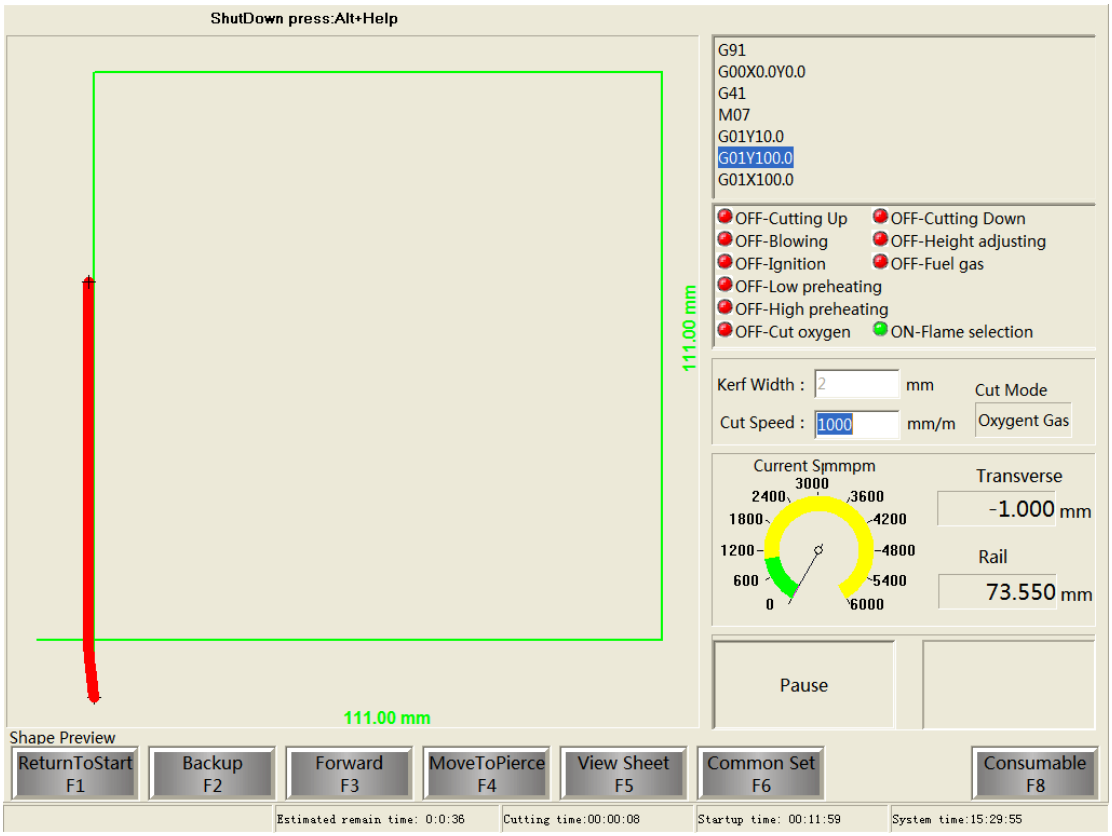


Figure 3.3.1.1 Pause interface

After pausing the process, you can perform some operations by pressing the following function keys:

Return To Start

To press this key, the cutting torch will return to starting point directly, namely the origin of the relative coordinates.

Backup

Press and hold F2, the cutting torch will come back along the processing path until the starting point. If F2 is released in the process, the torch will stop moving.

Forward

Press and hold F3, the cutting torch will go forward along the processing path until the end point. If F3 is released in the process, the torch will stop moving.

Move To Pierce

Select perforation point, number of the perforation point you want to move backward to, and number of the perforation point you want to move forward to, and select the number of the perforation point according to the S/N, as shown in the figure below:

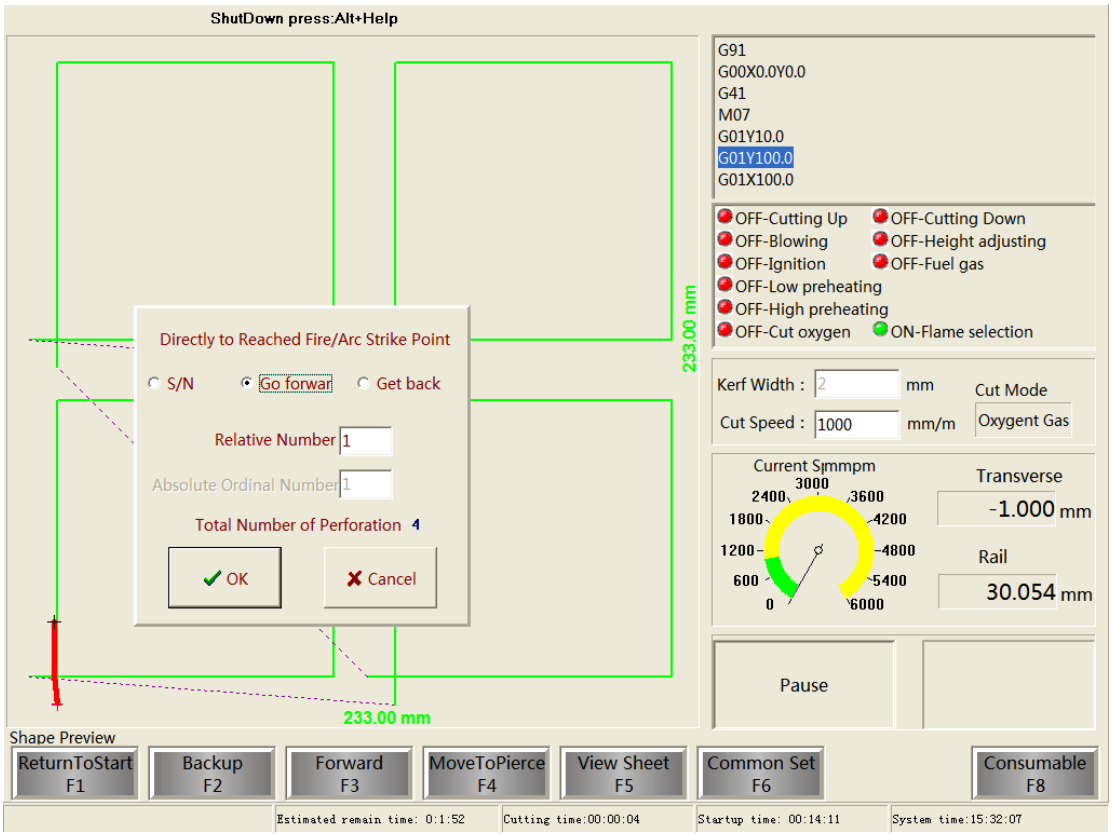


Figure 3.3.1.2 Move perforation point interface

The above figure shows how to select number of the perforation point. You can select in three different ways, “S/N”, “Forward” and “Backward”. After entering the data, press Enter and the cutting torch will move to the corresponding ignition point, then press START to continue cutting.

Note: if the selected ignition point is not found, the system will prompt you and remain still.

View sheet

To switch component display between plate size and component size.

Common set

Enter system setting interface. Refer to relevant paragraphs above for details.

Consumable

Enter Replace wearing parts interface. Refer to relevant paragraphs above for details.

3.3.2 Basic operation

There are some basic operations under Auto processing interface, as follow:

Preview

The system only runs X and Y trails, but the output switches such as preheating oxygen, gas control and cutting control will not open. It is used to predict the trail and check whether the size of the steel plate is correct.

Oxygen gas

The system is performing oxygen gas cutting craftsmanship.

Plasma

The system is performing plasma cutting craftsmanship.

Spraying

The system is performing powder spray marking craftsmanship.

Plasma mark

The system is performing plasma marking craftsmanship.

Moving function

Under the main interface, press the + or – key to zoom in or zoom out the Shape. Press + once, the Shape zooms in by 2 times and press - once, the Shape zooms out by 1/2.

Press Shift and ←, ↑, →or↓ at the same time, you can translate the Shape. Press once to move the Shape by 1/4 of the screen.

Preheat delay

While preheating, the bottom right of the interface will display the total time of preheating and the time already lapsed. At this time, if you press F8, the system will stop preheating and go to next action; if you press F6 once, the preheating time will be prolonged for 2 seconds; if the preheating time is enough, you can press F8 to stop preheating and go to the next action. If you press F7, the system will save the current preheating time for future use, and then go to next action.

Restart after pause

When the cutting torch is on the motion trail, press START to cut along the trail; when the torch is moved out

of the trail, the following message will display if you press START:

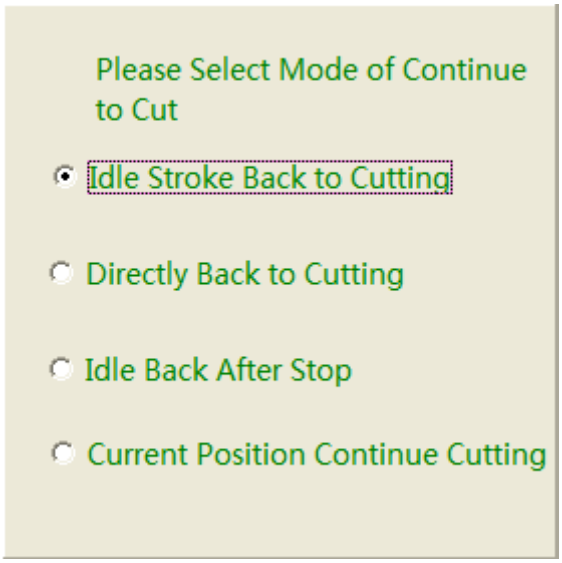


Figure 3.3.1.3 Continue cutting after pause

Press ↑ and ↓ to move the cursor to the interface you want, as shown in the figure, “Idle return and cut” means to return to the cutting trail automatically and then start perforating and cutting at the position of the trail; “Directly cut and return” means to perforate at the current position and then start cutting; “Idle return and stop” means the torch stops after idle returning to component trail without going to next action; “Continue at current position” means to cut the next Shape at the track position removed, but the reference point has been changed.

3.4 Manual processing

Under the main interface, press F11 and the system enters manual running mode, as shown in the figure below:

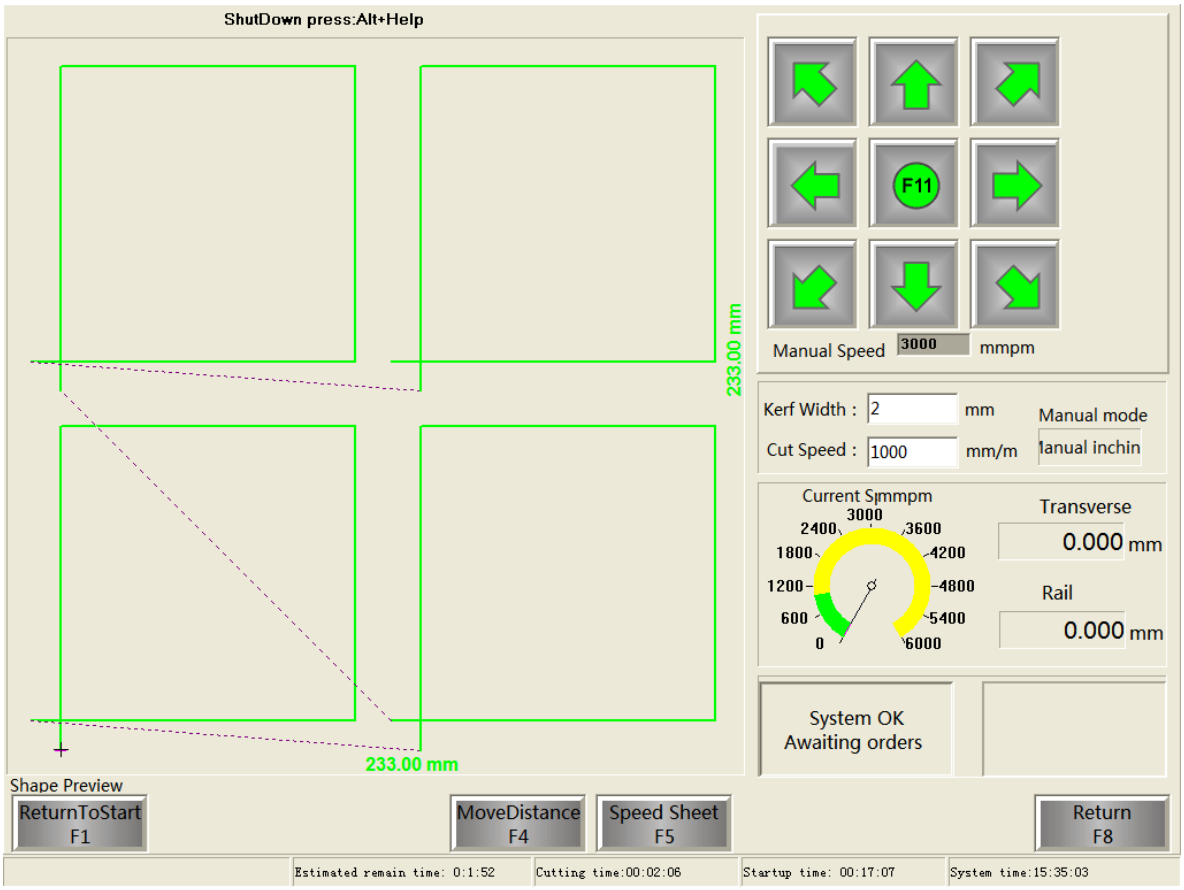


Figure 3.4.1 manual processing

The center right of the manual interface displays the manual modes. Press F11 to switch manual modes between manual point moving and manual self locking. In manual point moving mode, press ↖ ← ↙ ↑ ↗ → ↘ ↓ keys to move manually, and release the keys to stop. In manual self locking mode, press ↖ ← ↙ ↑ ↗ → ↘ ↓ keys to stop moving or to start moving. You can modify manual moving speed while it is stopped and press Enter to apply the modification. When the manual moving is stopped, press ESC to return to main interface.

3.3.3 Description to function keys

Return To Start

Under Manual interface, press F1 and the cutting torch returns to the reference zero point of the component. It has the same function of the Return to starting point in Auto manual.

Move Distance

Under Manual interface, press F4 to enter Fixed point moving interface, as shown in the figure below:

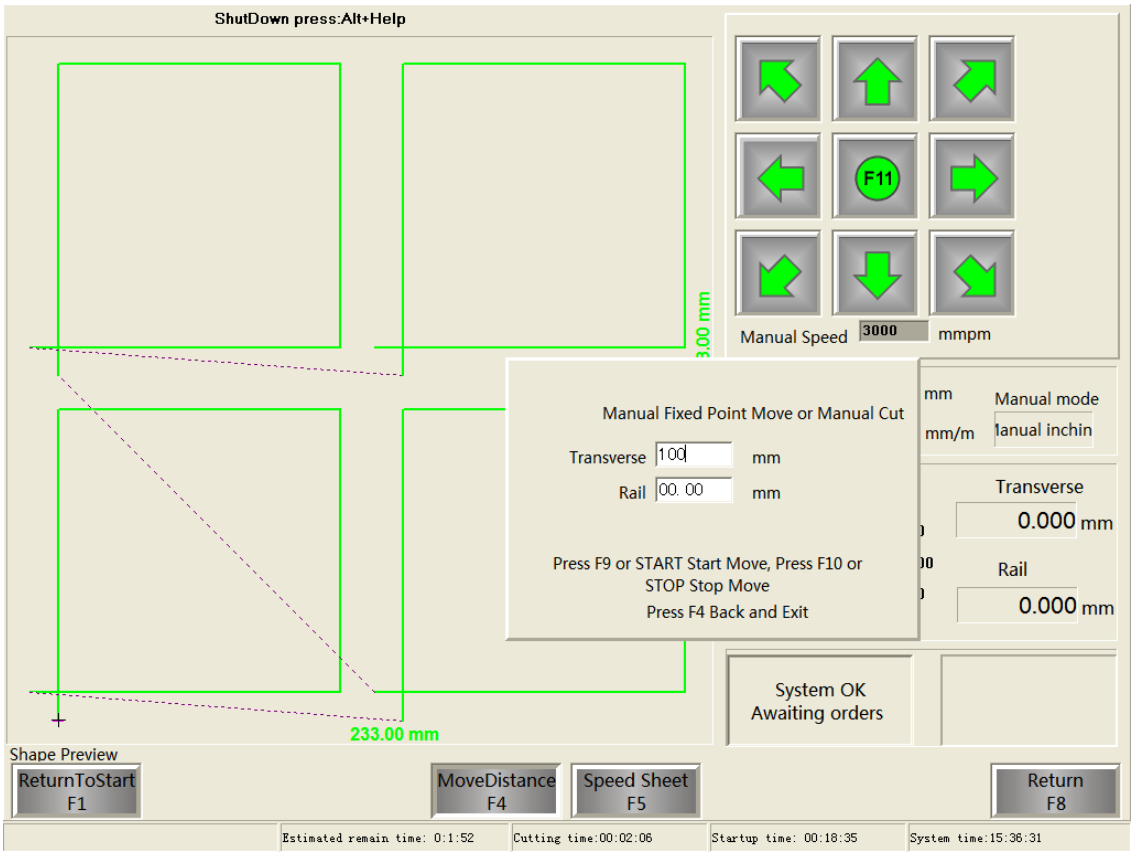


Figure 3.4.1.1 Fixed point moving

This function allows you to set a proper value for cutting torch to move. Use the number keys to set the distance of motion, then press START the torch will move the corresponding distance. Press F4 to cancel.

Speed Sheet

Sheet the manual speed.

Return

Under the Manual interface, press F8 to return to previous interface, namely the main interface.

3.4 System function keys

The system function keys are valid in the main interface, manual interface, pause interface and cutting interface only. The functions keys of this system includes: Ignition, Oxygen gas, Preheating oxygen, Cutting oxygen, HC, Plasma arc, Perforation and General switches. Details are as follow:

Ignition

Press Ignition under the main interface, manual interface, pause interface or cutting interface, the I/O port of the ignition will change (from open to close, or from close to open).

Oxygen gas

Press Oxygen gas under the main interface, manual interface, pause interface or cutting interface, the I/O port of the oxygen gas will change (from open to close, or from close to open).

Preheat oxygen

Press Preheating oxygen under the main interface, manual interface, pause interface or cutting interface, the I/O port of the low preheating and high preheating will change (from open to close, or from close to open).

THC

Press THC under the main interface, manual interface, pause interface or cutting interface, the I/O port of the THC will change (from open to close, or from close to open).

Plasma arc

Press Plasma arc under the main interface, manual interface, pause interface or cutting interface, the I/O port of the plasma ark will change (from open to close, or from close to open).

Perforation

Reserved.

General switches

Press General switches under the main interface, manual interface, pause interface or cutting interface, all I/Os will be closed.

4 Chapter IV Command System

4.1 Description to programming signs

Each step of CNC processing is performed according to the specific program. Each processing program is composed of several command segments, and each command segment is composed of several function words. The functions words should be started with letter followed by parameter values.

Definition of function words:

G Preparation function.

M Supplementary function.

L Circle times or time delay.

X X axis coordinate value: relative coordinate value under G91 (by default), and absolute coordinate value under G90.

Y Y axis coordinate value: relative coordinate value under G91 (by default), and absolute coordinate value under G90.

I The difference of the coordinate value of the circle center and the starting point of the X axis during arc processing.

J The difference of the coordinate value of the circle center and the starting point of the Y axis during arc processing.

R Specify radius of the arc.

4.2 Explanation to coordinates

4.2.1 Relative coordinates

In the coordinate system, if the position of a coordinate point is calculated from the position of another coordinate point, then this coordinate is called relative coordinate, as shown in the figure below:

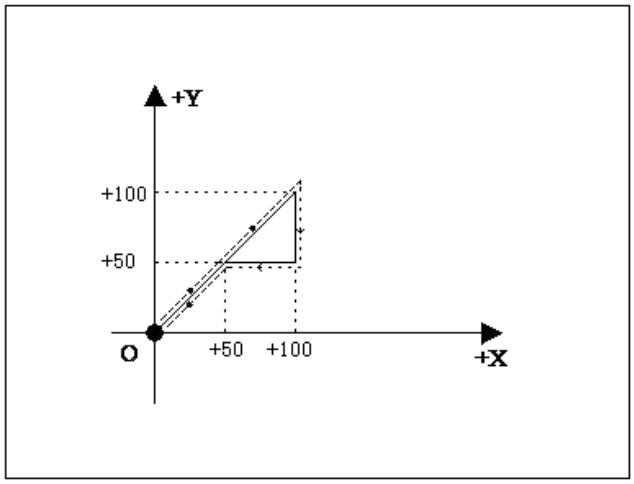


Figure 4.2.1.1 Relative coordinates

As shown in the figure above, if to calculate based on relative coordinates, the coordinate values of the entire Shape are:

1．Point A is the origin so the coordinate is X0　Y0;

2．Relative to point A, the coordinate of point B is X50　Y50;

3．Relative to point B, the coordinate of point C is X50　Y50；

4．Relative to point C, the coordinate of point D is Y-50；

5．When point D returns to point B, the coordinate is X-50.

4.2.2 Absolute coordinates

In the coordinate system, if the position of a coordinate point is calculated from the coordinate of the origin, then this coordinate is called absolute coordinate, as shown in figure 2.1, the coordinate values of the entire Shape are:

1． Point A is the origin so the coordinate is X0　Y0;

2． Referring to point A, the coordinate of point B is X50　Y50;

3． Referring to point A, the coordinate of point C is X100　Y100;

4． Referring to point A, the coordinate of point D is X100　Y50;

5． When point D returns to point B, the coordinate is X50　Y50.

4.3 G command instruction

4.3.1 G92 Reference point setting

While setting running program, the coordinate value of the starting point of the processing must be plated at the beginning of the program.

Format: G92 X0 Y0

If G92 is not followed by X and Y, then take the coordinates of the current X and Y as the reference point. Generally speaking, G92 is not followed by X and Y when using machine tool origin positioning.

4.3.2 G00 Idle replacement motion

This command realizes moving to the specified position in a rapid way. While displacement, the system moves at a straight line from the starting point to the end point at the max. manual speed limit. When G00 is moving, it is not influenced by the speed ratio.

Format: G00 Xn Yn

For example: G92 X0 Y0

G00 X75 Y75

M02

● Current cutting torch position.

○ Expected cutting torch position.

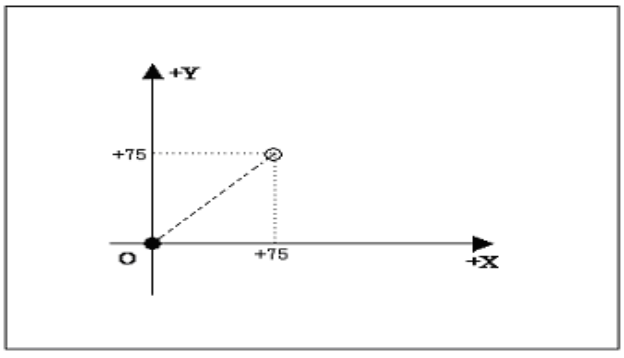


Figure 4.3.2.1 Idle displacement motion

4.3.3 G01 Straight line cutting

This command allows the cutting torch to move to the specified position in straight line. As a cutting and

processing motion command, it can compensate the motion with single axis or double axis in straight line.

Format: G01 Xn Yn

For example:

G92 X0 Y0

G90

G00 X100 Y50

G01 X-30 Y90

M02

● Current cutting torch position.

○ Expected cutting torch position.

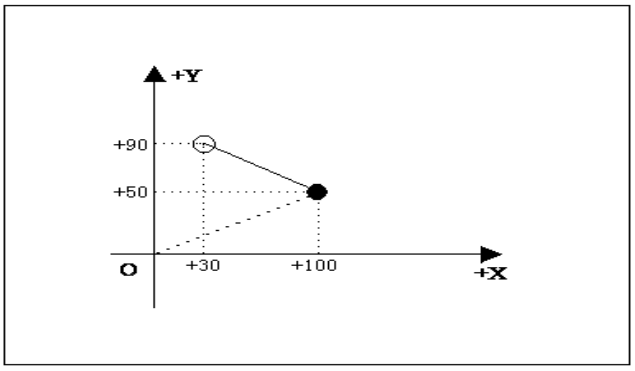


Figure 4.3.3.1 Straight line cutting

4.3.4 G02/G03 Arc cutting

This command is used to cut an entire circle or an arc. The circle can be divided into G02 (clockwise) and G03 (anticlockwise).

Format: G02[03] Xn Yn In Jn

For example (G02):

G92 X0 Y0

G00 X55 Y55

G02 X75 Y10 I35 J35

M02

Note: cut an arc clockwise

For example (G03):

G92 X0 Y0

G00 X55 Y55

G03 X75 Y10 I35 J35

M02

●Current cutting torch position.

○Expected cutting torch position.

Note:

I and J are increasing value of the circle center related to starting point at X axis and Y axis direction. In order to simplify the compilation of the processing files manually, you can just enter I50 J0 if you want to compile a circle with a diameter of 100mm; and enter I75 J0 if you want to compile a circle with a diameter of 150mm.

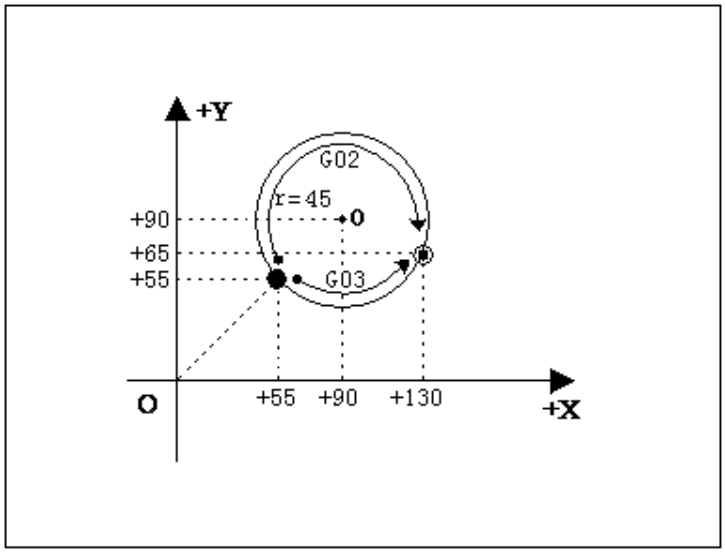


Figure 4.3.4.1 Arc cutting

4.3.5 Other G commands

G91/G90 Relative/absolute coordinates

G41/G42 Left/right slotting compensation

G40 Cancel slotting compensation

4.3.6 M commands

The system is customized with a supplementary command.

M44. This command is used to set the time delay. When the program executes this command, the system will delay according to the set time before executing the next code.

4.3.7 EIS command

Is、**Js command**

Is – Displacement of the X coordinate of the end point related to the starting point of the current segment, unit: mm;

Js – Displacement of the Y coordinate of the end point related to the starting point of the current segment, unit: mm;

Parameter definitions of the codes X, Y, I, J, -

X – Displacement of the X coordinate of the end point related to the starting point of the current arc segment, unit: mm;

Y – Displacement of the Y coordinate of the end point related to the starting point of the current arc segment, unit: mm;

I – Displacement of the X coordinate of the circle center related to the starting point of the current arc segment, unit: mm;

J – Displacement of the Y coordinate of the circle center related to the starting point of the current arc segment, unit: mm;

Parameter definitions of the codes X, Y, I, J , +

X – Displacement of the X coordinate of the end point related to the starting point of the current arc segment, unit: mm;

Y – Displacement of the Y coordinate of the end point related to the starting point of the current arc segment, unit: mm;

I – Displacement of the X coordinate of the circle center related to the starting point of the current arc segment, unit: mm;

J – Displacement of the Y coordinate of the circle center related to the starting point of the current arc segment, unit: mm;

\+ – Refers to the anticlockwise circle.

Attentions to EIS codes

Programming must be 29, 38 (slotting compensation) and 63 (program) ending command.

3 and 4 (explanation) may be ignored, but cannot be used individually.

5 and 6 must be used in pairs

7 and 8 must be used in pairs

Is and Js cannot be ignored

X, Y, I, J, and - cannot be ignored

X, Y, I, J and + cannot be ignored

5 Chapter V Examples for Editing and Processing Shapes

In this chapter, one of the following Shapes are cut as examples (dashed lines and arrows refer to the direction of the motion, and solid lines are the trails of cutting. "●" is the starting point of cutting):

Remark: as absolute coordinates are not usually used, it is not introduced in this Manual. All of the following examples adopt relative coordinates.

5.1 Standard circle

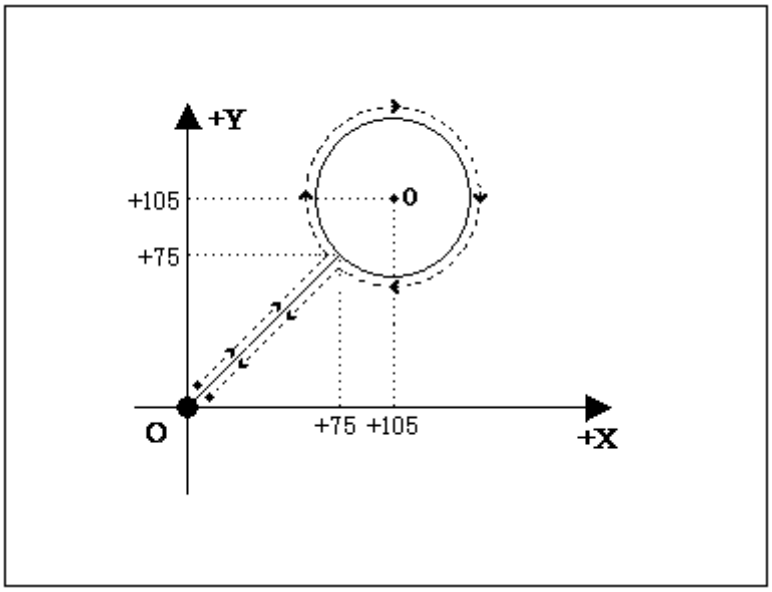


Figure 5.1.1 Standard circle

Shape program is as follow:

Relative coordinates programming and Shape codes:

0000: G92 X0 Y0 –Reference point setting;

0001: G01 X75 Y75 –Straight line cutting;

0002: G02 I30 J0 –Clockwise circle cutting;

0003: G00 X-75 Y-75 –Straight line idle displacement;

0004: M02 –Process completes.

5.2 Square

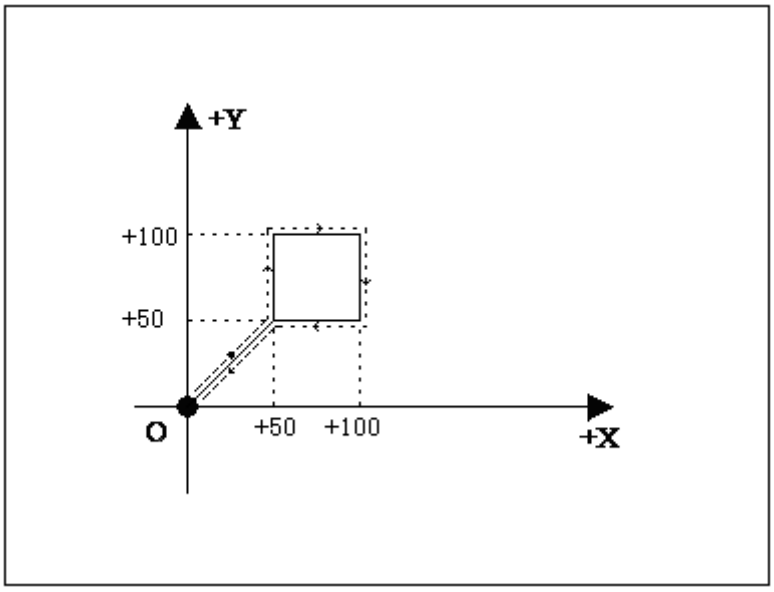


Figure 5.2.1 Square

Relative coordinates programming and Shape codes:

0000: G92 X0 Y0

0001: G00 X50 Y50 – Idle displacement

0002: G01 Y50 –The first edge;

0003: G01 X50 –The second edge;

0004: G01 Y-50 –The third edge;

0005: G01 X-50 –The fourth edge;

0006: G00 X-50 Y-50 –Idle displacement

0007: M02 –Process completes

5.3 Triangle

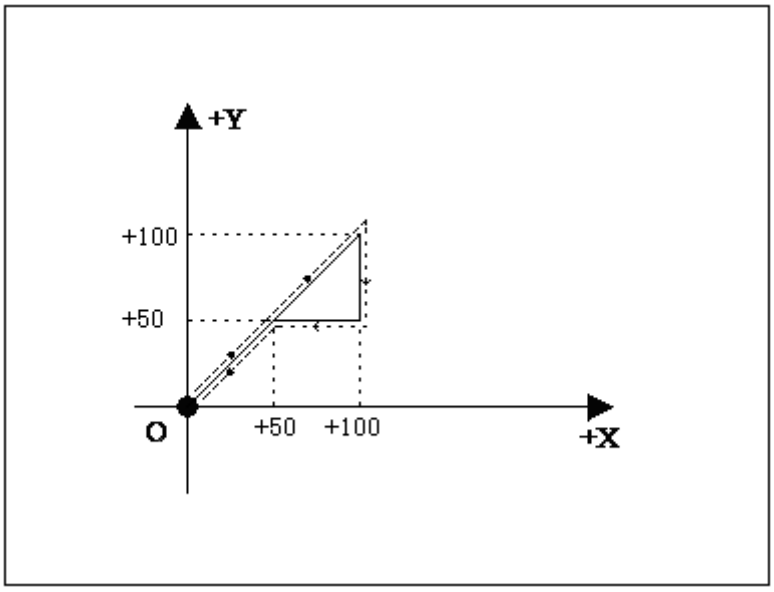


Figure 5.3.1 Triangle

Relative coordinates programming:

0000: G92 X0Y0

0001: G00X50 Y50

0002: G01X50Y50

0003: G01Y-50

0004: G01X-50

0005: G00X-50Y-50

0006: M02

5.4 Quincunx

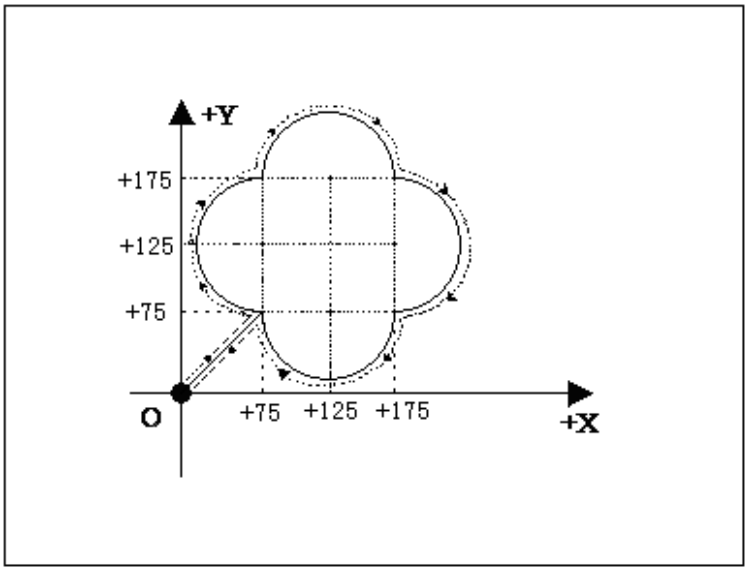


Figure 5.4.1 Quincunx

Relative coordinates programming

0000: G92 X0Y0

0001: G00 X75Y75

0002: G02Y100I0 J50

0003: G02X100I50J0

0004: G02Y-100I0 J-50

0005: G02X-100I-50 J0

0006: G00X-75Y-75

0007: M02

5.5 Four-circle shape

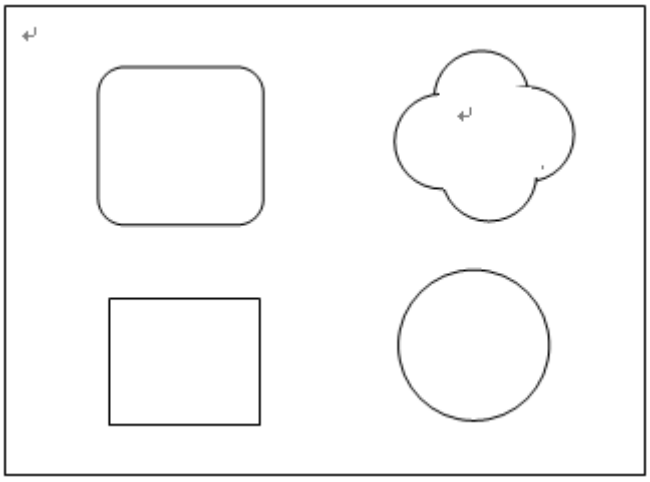


Figure 5.5.1 Four-circle shape

Relative coordinates programming

```
0000: G92X0Y0
0001: G00 X50
0002: G01 Y200
0003: G01 X200
0004: G01 Y-200
0005: G01 X-200
0006: G00 Y400
0007: G01 Y50
0008: G02 X50 Y50 I50 J0
0009: G01 X100
0010: G02 X50Y-50 I0 J-50
0011: G01 Y-100
0012: G02 X-50 Y-50 I-50 J0
0013: G01 X-100
0014: G02 X-50 Y50 I0 J50
0015: G01 Y50
0016: G00 X400 Y50
0017: G02 X100 Y0 I50 J0
0018: G02Y-100 I0 J-50
0019: G02X-100 I-50 J0
0020: G02Y100 I0 J50
0021: G00 X-50 Y-350
0021: G02 X0 Y0 I100 J0
0023: G00 X-400 Y-100
0024: M02
```

6 Chapter VI Command List

6.1 G command inquiry

S/N	Command name	Description
1	G00	Rapid point motion (idle running)
2	G01	Straight line processing
3	G02	Clockwise circle processing
4	G03	Anticlockwise circle processing
5	G92	Processing reference point setting

6.2 M command inquiry

S/N	Command name	Description
1	M02	Program completes
2	M44	Pause/delay

6.3 EIS command inquiry list

S/N	Command name	Description
1	3	Explanation segment starts
2	4	Explanation segment ends
3	63	Program completes
4	29/30	Kerf compensation
5	38	Cancel kerf compensation
6	Is Js	Straight line displacement
7	X Y I J -	Clockwise arc displacement
8	X Y I J +	Anticlockwise arc displacement
9	5	Idle displacement starts
10	6	Idle displacement ends
11	7	Cutting starts
12	8	Cutting completes

7 Chapter VII Troubleshooting

Classification	S/N	Description	Inspection
Abnormal action	1	Motor cannot startup or system down during auto processing	Check whether “Cutting speed is properly set
	2	Motor cannot startup or system down during manual processing	Check whether “Manual speed is properly set
Cutting quality	4	Error in accuracy	Check the “Accuracy setting” in “System setting->Encryption setting”
	5	Angle of the cut square is not right angle	Adjust the acceleration and corner speed in “System setting->Speed parameters”
	6	There is diagonal dithering while cutting circle	Adjust the “Accuracy setting” in “System setting->Encryption setting” and set the X pulse offset to be very close to B pulse offset.
Abnormal operation	7	The cutting torch does not act after pressing START under the main interface	Check whether hardware contacts with the limit and whether the torch is enabled
	8	The air valve does no act or the external switch does not function	Make relevant inspection in “System setting->System diagnosis” interface
Others	9	Poor anti-interference ability of plasma	Check whether the equipment is properly grounded

Revision history (I)

Feedback by		Date	2011/12/2	Current version/Page	V0.1.0/108
Description	Update descriptions to the adjustment of organizational structure and modification of interface of HC8200 software				
Confirmed by engineer					
Version after revision		Page after revision	108	Revised by	Guo Haibo